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A Reclassification of Western Hemisphere Typhlocybinae (Homoptera, Cicadellidae)¹

BY

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ABSTRACT: The subfamily is treated for the New World. Keys to tribes, genera, and subgenera are included with illustrations of structures useful in classification. Describes four tribes, one of which is new; 58 genera and subgenera, 32 of which are new (including two old and two new genera under joint authorship with Mr. Paul J. Christian). New tribe: *Erythroneurini*; new genera: *Hadralebrea* (for *Dikraneura* (*Hyloidea*) *laticeps* Osborn), *Rabela* (for *Protalebrea tabebuiae* Dozier), *Orsalebrea* (for *Orsalebrea robusta*, n. sp.), *Balera* (for *Dikraneura pellucida* Osborn), *Diceratalebrea* (for *Alebrea sanguinolinea* Baker), *Trypanalebrea* (for *Protalebrea maculata* Baker), *Brunerella* (for *Brunerella magnifica*, n. sp.), *Habralebrea* (for *Protalebrea nicaraguensis* Baker), *Elabrea* (for *Protalebrea eburneola* Osborn), *Rhabdotalebrea* (for *Protalebrea octolineata* Baker), *Protalebrella* (for *Protalebrea brasiliensis* Baker), *Endoxoneura* (for *Dikraneura* (*Hyloidea*) *splendidula* Osborn), *Kidrella* (for *Dikraneura santana* Beamer), *Donidea* (for *Typhlocyba verticis* Baker), *Dikrellidia* (for *Dikraneura bilineata* Osborn), *Kunzella* (for *Dikraneura marginella* Baker), *Neodikrella* (for *Dikraneura* (*Hyloidea*) *disconotata* Osborn), *Sarascarta* (for *Dikraneura* (*Hyloidea*) *fulva* Osborn), *Buritia* (for *Dikraneura lepida* McAtee), *Saranella* (for *Dikraneura* (*Hyloidea*) *miconotata* Osborn), *Eupteroidea* (for *Typhlocyba stellulata* Burmeister) *Henribautia* Young and Christian (for *Typhlocyba nigricephala* Beamer), *Ossiannilssonina* Young and Christian (for *Typhlocyba berenice* McAtee), *Neojoruma* (for *Joruma adusta* McAtee), *Paulomanus* (for *Paulomanus cecropiae*, n. sp.), *Beamerella* (for *Erythroneura tropicalis* Osborn); new subgenera: *Delongia* (for *Dikraneura luna* DeLong and Caldwell) in genus *Dikraneura*, *Readionia* (for *Dikraneura readionis* Lawson) in genus *Dikrella*, *Jorumidia* (for *Joruma curvata* Osborn) in genus *Joruma*, and *Erasmoneura* (for *Erythroneura vulnerata* Fitch), *Erythridula* (for *Tettigonia obliqua* Say), and *Eratoneura* (for *Erythroneura dira* Beamer) in genus *Erythroneura*; new synonymy: *Paralebrea* McAtee (= *Plagalebrea* McAtee), *Dicranoneura* Douglas (= *Forcipata* DeLong and Caldwell),

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Parallaxis McAtee (= *Erythria* Fieber of Baker, in part), *Alconeura* (*Hyloidea*) McAtee (= *Dikraneuroidea* Lawson), *Joruma* McAtee (= *Jorumella* McAtee), *Rabela tabebuiae* (Dozier) (= *Protalebra* *bicincta* Osborn), *Elabra attenuata* (Osborn) (= *Dikraneura* *albidula* Osborn), *Parallaxis donaldsoni* (Baker) (= *Parallaxis vacillans* McAtee), *Parallaxis guzmani* (Baker) (= *Parallaxis clathrata* McAtee), *Donidea verticis* (Baker) (= *Dikraneura* (*Hyloidea*) *eburnea* Osborn), *Dikrella californica* var. *imbellis* (Lawson) (= *Dikraneura nevadensis* Lawson), *Idona beameri*, n. n. (= *Idona hyalina* (Beamer nec Osborn)), *Hymetta balteata* McAtee (= *Hymetta distincta* Fairbairn), *Typhlocyba querci* var. *querci* (Fitch) (= *Typhlocyba gillettei* var. *fitchii* McAtee) [Young and Christian], *Beamerella tropicalis* (Osborn) (= *Erythroneura similis* Osborn), *Empoasca breviceps* (Osborn) (= *Dikraneura alebroidea* Osborn), *Alconeura santaritana*, n. n. (= *Alconeura beameri* Griffith nec Lawson), *Empoasca ornatella*, n. n. (= *Empoasca ornata* Oman nec Osborn); new status: *Aphanalebra* McAtee, *Kallebra* McAtee, and *Paralebra* McAtee elevated to genus, *Hyloidea* McAtee reduced to subgenus of *Alconeura* Ball and DeLong, *Rhabdotalebra similis* (McAtee) elevated to species; *Alebra dorsalis* Gillette moved to *Deltocephalini*.

The subgenus *Scinda* DeLong and Ruppel is elevated to generic rank.

INTRODUCTION

The present problem was undertaken at the joint suggestion of Dr. R. H. Beamer of the University of Kansas, and Dr. P. W. Oman of the Division of Insect Identification of the United States Department of Agriculture.

The last treatment of the genera of the subfamily was that of McAtee (1934a). That classification was based primarily on the venation of the apical portions of the fore and hind wings, and aside from those characters mentioned in the key, the genera were not characterized. The venation of the base of the hind wings was not taken into account in the key, nor were the characters of the male genitalia, although genital characters already had come to be of recognized value in establishing the identity of species.

The emphasis which the venation of the wing apex received as a result of the McAtee classification led generally to the oversight of many other useful characters, and indeed to the neglect of the most significant characters of the wings themselves, the venation of the vannal region of the hind wings. Following the McAtee classification, workers describing new species placed these in already existing genera, frequently without pausing to analyze their relationships to the genotypes involved. There resulted many heterogeneous genera, which could be recognized almost solely on the basis of the venation of the wing apices, and occasionally not even on that character.

Since 1934, Ribaut (1936b), in a study of the French Typhlocybinae, recognized interspecific relationships and placed the French species in groups, which in some cases constitute genera, and in others constitute species groups within genera. Oman (1949a) described two new genera in the subfamily, and pointed out the need for a critical study of the group. DeLong and co-workers have also described several genera and subgenera.

The aim of the present paper has been to restudy the Western Hemisphere typhlocybinae genera with a view to a fuller characterization of genera and the development of a more natural system of classification. It has been necessary, in so doing, to describe a number of new genera. Moreover, in several instances, it has been found necessary to base a new genus on a single species, most often in cases involving Neotropical species. The tropics of the New World, however, have been so poorly covered by collectors that the writer subscribes to the opinion that many of the Neotropical genera, which are monobasic in the present treatment are not likely to remain so when more collecting has been done.

In other cases, the same paucity of material has led to the retention of some genera which are admittedly heterogeneous, for example in the Alebrini, where forms which were fairly closely related morphologically were retained in the same genus for want of sufficient material to establish where discontinuity in variation might occur.

THE SUBFAMILY TYPHLOCYBINAЕ

Definition. Relatively few constant characters have been found in this group of diversified insects. Most of the characters formerly cited as diagnostic for the subfamily have failed to survive the collection and study of additional materials.

The comparatively small size of the leafhoppers of the subfamily is useful, to some extent, in identifying it, but the smallest members of some other subfamilies are exceeded in size by the largest Typhlocybinae. There has been a reduction in area and venation in the apical portion of the costal area of the hind wing, but such a reduction is present in some non-typhlocybinae leafhoppers, and its degree is variable within the Typhlocybinae.

From a practical standpoint, all leafhoppers which lack *discal* branching of the longitudinal veins of the fore wings, basad of the bases of the apical cells, may be placed in this subfamily. And even this character is not infallible, for in certain Alebrini, the occurrence of adventitious cross veins may present the appearance of branched

longitudinal veins, an appearance certain to be confusing to one not familiar with the group. Coincident with this lack of discal branching of the longitudinal veins, is the occurrence of only two antepical cells, a character which does, however, occur in another subfamily.

Nomenclature. This work has employed the name *Typhlocybinae* in its title, because that name conforms to the practice of retaining suprageneric names with priority. Apparently the first use of the group name was that of Kirschbaum (1868b:16) who used "Typhlocybidae" as a subfamily name.

If one did subscribe to using the oldest generic name as a basis for a subfamily name, then because of a nomenclatorial problem concerning the true identity of the genus *Cicadella* Duméril, the correct name of the subfamily would be presently in question. Duméril (1806a), in a publication which listed a synoptic table of some families of Homoptera, divided the leafhoppers into two groups: those with ocelli, and those without ocelli. He mentioned the name *Cicadella* in his discussion of the group in which ocelli were present.

In the same year, Froriep (1806a), in a German translation of the Duméril work, listed *Cicadella vittata* (L.) as an example of the group in which ocelli were present, and this was the first (and at that time the only) included species. On the basis of this, *Cicada vittata* Linnaeus can be considered the type of the genus *Cicadella* Duméril, and if this course is followed, then *Cicadella* Duméril is a genus in the subfamily under treatment, and incidentally the oldest genus, and the subfamily could be appropriately designated "Cicadellinae."

But, on the other hand, as Wagner (1950a) has pointed out, *Cicada vittata* L. is a species which does not have ocelli, and its selection by Froriep as an example of *Cicadella* Duméril can be considered to have violated the intent of Duméril. Wagner therefore designated *Cicada viridis* L. as type of the genus *Cicadella* Duméril, pointing out that this species *does* have ocelli, and does not, therefore, violate the intent of Duméril. Moreover, he suggested that this selection of type of the genus had the added advantage of making *Cicadella* Duméril and *Cicadella* Latreille isogenotypic, thereby relegating the latter to synonymy under the former.

The writer subscribes to the opinion that the solution is not as simple as Wagner suggests. In the first place, it seems that Froriep's designation of *Cicada vittata* L. as an example of *Cicadella* Duméril may be construed as a type fixation, in spite of the fact that

it does not conform to the original characterization of Duméril, unless a ruling to the contrary is forthcoming from the International Commission on Zoological Nomenclature. Certainly the arbitrary selection of a type which violates, in one character or more, the original description of a genus is no novel occurrence. Moreover, as Oman (*in litt.*) has pointed out, Duméril himself, in a subsequent paper (1816a) listed *vittata* as an included species in his own genus *Cicadella*.

Doctor Wagner's action was probably motivated partly by the desire to restore the name *Cicadella* to the group recently designated Tettigellinae, which group was called Cicadellinae based on *Cicadella* Latreille (type, *Cicada viridis* L., by subsequent designation of Van Duzee, 1917) until 1946 (China and Fennah 1946a). The writer agrees that such a course would minimize the confusion in the literature, and Doctor Wagner's action is followed herein. It is hoped, however, that the status of *Cicadella* Duméril will be stabilized by a ruling of the Commission.

The removal of the name *Cicadella* from this subfamily restores the name *Eupteryx* as the oldest genus, and the subfamily could be appropriately designated Eupteryginae.

Phylogeny. The relationship of the Typhlocybinae to other subfamilies has long been obscure. The present work has done little to clarify this question, and the writer is unable to state which of the various subfamilies of Cicadellidae are probably closely related to the Typhlocybinae, or indeed whether only a single subfamily is to be sought in this connection.

It would be impractical to hope for any solution of the problem of phylogeny within the subfamily from a study of the Western Hemisphere forms alone, or even with a consideration of Palaearctic forms as well. It has been found convenient, however, in the present treatment, to represent *relationships suggested by morphological considerations* in a conventional "tree" form in two instances. It is hoped that other students of the group will look upon these as they have been considered by the writer—as tentative, and as a basis for further investigation in the light of studies of species from other faunal regions. Further remarks on phylogeny are included in the sections below, which deal with tribal characteristics.

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Mr. Paul J. Christian, of the University of Kansas, has been of great assistance in the present treatment of *Typhlocyba*, and has collaborated in the description of several segregates from this complex.

The University of Louisville has helped greatly through a grant-in-aid, in facilitating the work.

Plate 1 was made by Mr. Arthur D. Cushman of the Division of Insect Identification, U. S. Department of Agriculture. Mrs. Barbara Rozen, of the University of Kansas, has inked most of the remainder of the illustrations used herein.

To the above persons and institutions the writer is obliged, and to them rightly belongs much of the credit for whatever herein may be found to be creditable.

TECHNIQUE

Techniques are, in the final analysis, individual matters, and there are probably as many techniques and modifications of techniques as there are experts. Any technique which will make the internal male genitalia available for study under very high magnification is a suitable one for this group of insects, provided the structures are not damaged in the process. The following method is that preferred by the writer, for the study of the genital capsule and its contents. Little of it is original.

The entire abdomen is removed from the specimen and placed in ten percent caustic potash which is then heated to the boiling point. The abdomen is allowed to remain in the hot caustic for a period which varies with the degree of sclerotization of the specimen. In heavily sclerotized specimens, the abdomen is removed from the solution when the conjunctivae become conspicuously pale. In less heavily sclerotized specimens, the abdomen is removed from the solution when it becomes hyaline. The abdomen is placed in distilled water for about ten minutes, then transferred to acid fuchsin (0.5%). After a few minutes, the abdomen is placed in acidulated distilled water for a few minutes to remove the excess stain. It is then placed in a hollow-ground slide in a drop of acidulated glycerine (made by adding two drops of glacial acetic acid to a dropper bottle of glycerine). The genital capsule is then removed from the abdomen and studied *in toto*.

The straining procedure outlined above permits minute examination of the capsule with "high dry" of the compound microscope, and the resolution of even minute microsetae.

After the *in toto* examination, using very small needles (*minuten nadeln*), the conjunctiva at the base of the anal tube is cut through, throughout its circumference, the anal hooks, if present, are loosened with gentle pressure, and the needles are passed between the

aedeagus and the anal tube to sever the minute connections which remain after the maceration process. The anal tube, with its hooks, is thus removed in one piece.

One of the needles is next inserted through the anterior opening of the capsule (left by removal of the abdomen) and placed laterad of and in contact with, but not pressing upon, one of the styles at its base. The other needle is inserted through the opening left by removal of the anal tube and its point placed slightly caudad of the point of the first needle. A gentle mesad nudge of the second needle separates the style from the plate to which it is articulated. The procedure is then repeated for the opposite style. The needles are then moved in an arc around the dorsal apodeme as a center, to sever any remaining connections between the aedeagus and the capsule wall, and the internal genitalia are then removed from the capsule which is left intact. Difficulties occur in the Alebrini, where the articulating surface between the style and the male plate is quite long. Difficulty is also experienced in some Alebrini and in *Dicranoneura* where the connective is membranous and hence not of aid in sustaining the relative positions of the internal structures. In such cases, the writer prefers to leave the internal genitalia attached to the male plates (which thus serve to support them) and to remove the pleural and dorsal walls of the ninth segment in one piece so that the internal structures can be seen without any intervening integument to diminish the resolution.

When drawings are to be made, the author uses a very small amount of Boric Acid Ointment, as an adhesive, smeared in the concavity of the slide before the glycerine is added. The specimen may be studied under the binocular dissecting microscope, from several different aspects, without any contact with the adhesive. After study *in situ*, the capsule is oriented for drawing and moved to the edge of the adhesive, and its anterior rim pressed lightly into the adhesive. The slide is now moved to the monocular microscope for drawing. The Abbé condenser of the compound microscope will compensate for a great degree of difference in intensity of stain. Destaining is seldom necessary, but may be accomplished quickly by washing in water briefly, or more slowly by allowing the structures to remain in glycerine. In orienting the structures with the dissecting microscope, good results are achieved using a dark background behind the translucent adhesive and a light background (a piece of white paper) beneath the structures being oriented.

In making drawings of the genitalia, a ruled ocular and co-ordinate paper were employed. Because of the great variation in size

of structures in different species, the drawings were made at several different magnifications, as indicated opposite the plates. In all of the drawings of the genital capsule, the anal tube is diagrammatic.

There has been some difference of opinion among workers as to the advisability of removing the internal male genitalia, or leaving them in the capsule. Advocates of the latter method are probably motivated by a desire not to distort the styles, which may rotate somewhat at their articulation with the connective, during or after dissection. If the styles are drawn in detail, however, another worker will have a sufficient number of reference points to orient the structures properly for comparison. If drawings are made with the styles oriented in such a way that their broadest portion is uppermost, the orientation is easily duplicated for comparison. This has been done in a number of instances in the present paper, and the view has been designated "broad aspect." Actually, it may be lateral or ventrolateral. Its use enables permanent slide mounts to be used to advantage where a worker desires to employ such a technique.

After study, the internal structures and the anal tube are placed within the genital capsule, and the latter placed within the empty abdominal wall which thus serves as a container for the smaller structures. The abdomen is next placed in a drop or two of glycerine in the bottom of a small vial through the cork of which the pin bearing the specimen is thrust diagonally, so that the glycerine tends to remain at the bottom of the vial out of contact with the cork.

For taxonomic purposes the wings may be exposed for observation by inserting a dull-pointed needle, from the rear, beneath the combined wings, between the wings and the dorsum of the abdomen, keeping the long axis of the needle parallel to the mid-line of the dorsum. The needle is then lifted vertically, so that it pulls out, as an overlying flap, the mesal margin of whichever hind wing lies uppermost. If care is employed, no damage to the specimen results, and the venation at the base of the hind wing can be seen in the flap thus exposed. The venation at the apex of the hind wing can be seen by gently lifting the fore wing and pulling it slightly laterad.

If wing slides are to be made, the dry wings are removed from one side of the specimen and placed on a clean dry slide. The jugal lobe is unfolded and pressure applied to one point along the jugal fold to keep the lobe from springing back to its

original position. Four small drops of plastic adhesive are placed on the slide to hold the corners of a square cover glass, which is next applied and pressed slightly to flatten the wings. An air mount is thus obtained. For drawing these, the writer employs a projection apparatus. The width of the wing veins was not indicated in any of the drawings included here.

In the case of most of the Carnegie Museum specimens, the wings were torn badly in many instances, and greatly folded and stuck together in other instances. It was possible, by immersing the specimens in water, to remove the wings without further damage to them. The wings were then flattened and unfolded or uncoiled against the surface film of a drop of water, which was allowed to dry. The cover glass was applied as described above to form an air mount.

MORPHOLOGY

It is not within the scope of the present undertaking to give a detailed account of the morphology of the typhlocybine leafhoppers. For a more detailed account than that which follows, the reader is referred to recent works of Oman (1949a), Ribaut (1936b), Kramer (1950a) and Evans (1946a). In general, the terms used are those which have been used over a long period of time by taxonomists in the group.

The wings. The homologies of the wing veins have not yet been settled to the satisfaction of workers in the group, with the result that some of the veins still bear names of convenience, rather than names which express their relationship to a typical venation pattern. It seems fairly generally agreed that the three principal longitudinal veins are R, M, and Cu in both wings. The system used by Beamer (1938a) is used for the fore wing in this treatment. The apical cells, for convenience, have been numbered from inner to radial margin. Oman (1949a) employed this unusual method of numbering the apical cells because supernumerary cross veins to the costa occur in the preapical region of the fore wing fairly commonly in some groups of leafhoppers (occasionally in the subfamily under discussion). Such veinlets rarely occur in the commissural preapical region. Thus, starting from the commissural margin of the fore wing, less confusion results than would occur if the numbers started from the costal margin.

In the hind wing, the posterior branch of vein R may retain its separate identity to its apex, or it may undergo a preapical fusion with the apical portion of the anterior branch of vein M (Plate 2,

fig. 5, "R + M"). The m-cu cross vein is usually diagonal, so that Cu_1 appears to be forked apically, but what appears to be the anterior branch is actually m-cu continued as M_{3+4} (fig. 5) according to recent studies, and Cu_1 is actually unbranched. Vein Cu_2 is always unbranched in this subfamily. The hind wing possesses two folds, one functional fold, the jugal fold, which delimits the jugal lobe, and a second more anterior non-functional vannal fold. Between these folds is the vannal area of the wing. It exhibits a maximum of two veins, here designated 1V and 2V which are always at least partially fused. The apices of at least some of the longitudinal veins are prolonged in a common submarginal vein, of variable extent between species groups.

The longitudinal veins of the hind wings present many good generic characters, and some characters of suprageneric value. The vannal veins appear to be very conservative, as does the course of vein Cu_2 . The apex of Cu_1 , in some groups, has undergone coalescence with M_{3+4} , a development which appears to have occurred polyphyletically. In the Alebrini, the degree of fusion of R and M is a somewhat variable character between species of a genus, and even between wings of a single specimen.

As in the case of the fore wings, supernumerary cross veins frequently occur also in the hind wings, but are easily recognized as such from their position. A cross vein is typically present between R and M when these are not fused apically. This cross vein and the base of vein M_{3+4} (which has the appearance of a cross vein) have been found to be quite inconstant in position.

In the descriptions which follow, in discussing comparative lengths and widths of cells, unless otherwise designated, the greatest length or width is meant. In the case of the apical cells of the fore wing, the width is measured at right angles to the long axis of the wing even though this may be the greatest dimension of the cell.

The male genital capsule. The tergum and pleura of the ninth segment are collectively designated the *pygofer*. From the very narrow sclerotized ventral portion of the ninth segment there arise a pair of lobose appendages which extend caudad beneath the pygofer. The homology of these *male plates* is not known, but it is generally held that they are not true segmental appendages. In most genera, the male plates are flat pouchlike structures, but in the Alebrini, they appear to be cylindrical apically, perhaps as a result of a rolling and fusing process. Both the pygofer and the male plates usually bear setae, the general arrangement of which is frequently constant for a given genus. The pygofer often bears

a pair or pairs of *pygofer processes* (or *pygofer hooks*) which arise as projections from the pygofer wall. They may arise as thickenings of the dorsal or ventral portion of the wall, or from the posterior pygofer margin. They are constant in manner of origin in some genera, variable in one or both of these features in others. In illustrating the capsule, the pygofer hooks have been drawn *in situ* unless this complicates the illustration too much or tends to obscure other features. Occasionally, the anal tube gives rise to sclerotized processes, the *anal hooks*.

The internal male genitalia. The aedeagus (Plate 2, fig. 7) is essentially a campanulate structure, with the terminal opening at the narrow end. The broader basal opening is here designated the *genital atrium*, and its border the *atrial rim*. The term *shaft* is restricted to that portion of the aedeagus traversed by the completely enclosed gonoduct. The shaft is usually directed dorsocaudad. At the periphery of the genital atrium, usually as a modification of the atrial rim, an apodeme occurs. Usually it is dorsal, but it may be paired, arising bilaterally from the atrial rim. Frequently, it is of similar form in closely related species (e. g. *Kunzeana* spp.). Occasionally, the atrium is preceded by a conspicuous preatrial portion, here designated the *preatrium*. When a preatrium is present, it articulates with the connective, and when it is absent, the articulation with rare exceptions is with the ventral portion of the atrial rim. Aedeagal processes occur in great variety. They may be preatrial or atrial in origin, or they may arise on the shaft or on the apodeme. In the descriptions which follow, the processes are designated as to their origin wherever possible. Occasionally they occur in such a manner as to be difficult of definition, for example in the region of the ventral limit of the preatrium and the beginning of the shaft. In such cases, they are referred to simply as "aedeagal processes" with further description of their point of origin.

The connective articulates with the styles laterally (Plate 2, fig. 8), and with the base of the aedeagus apically. It occurs as a linear cross-bar, a triangle, in the form of the letters "U" or "V" or "Y" or in the form of a trapezoid. It may possess various thickenings. In most cases the apex is curved dorsad and the aedeagus articulates with the subterminal portion, but the articulation may be terminal, dorsal, or much more basad. Occasionally the connective is thin and membranous and observed only with difficulty, even with good staining. Frequently, the form of the connective is constant within a genus.

The *styles* (Plate 2, fig. 8) occur one on each side of the connective. They consist each of a short cephalad-produced portion and a longer caudad-produced portion. The anterior portion is quite variable in form and appears to have little taxonomic value. The posterior portion is quite conservative in form and frequently exhibits characters diagnostic for genera. In the remainder of this treatment, in referring to the length of the style, unless otherwise designated, only the posterior portion (connective to posterior apex) is under consideration.

In form, the style may be slender and tubular, or it may exhibit expansions in one or more planes, forming a lobe or lobes. It may bear setae which are quite constant in arrangement. Apparently in the higher genera of Erythroneurini, it has undergone a first, then a second apical extension from a simple form with an expanded apex. The accuracy of this idea, based purely on the morphology of the style apices cannot be established here. It might be strengthened or weakened by careful ontogenetic studies of the development of the apex of the style in species of *Erythroneura*. In figures 8 to 15, a series of style apices have been illustrated to show what appears to be first, an apical extension from a style with a flattened apex, such as occurs in *Dikrellidia* (fig. 8), for example; second, a flattening of this first extension from the apex of the style to form a broad, flat extension, as in *Zygina* (fig. 9), and third, a second extension from the apex of the first to form the posterior point (and the anterior point, when present) of the style, as in many *Erythroneura* species.

Following the above hypothesis, the parts of the style have been labeled accordingly, in order to make possible more precise descriptions. The lobe of the basic style pattern is designated the *preapical lobe*, and the *first* and *second extensions* have been designated as such. The mesal extremity of the first extension, in keeping with the terminology established in the literature, is designated the *heel*, and the posterior extremity of the second extension, the *posterior point*.

In some members of the Alebrini, a preapical expansion of the style occurs which apparently is not homologous with the preapical lobe mentioned above, for there is no indication that the narrower apical portion is of the nature of an extension, for no line of demarcation can be seen between the basal portion and the "extension."

Genitalia preparations of the Alebrini, usually have preserved the

bulbus ejaculatorius and the duct leading from it to the genital atrium. The same structure is seldom preserved in macerated specimens in other groups.

The head. The form of the head has been little used in the present system of classification, in spite of the fact that its form is quite characteristic, so much so that experienced taxonomists in Cicadellidae may frequently make an accurate determination of a genus from the head alone. Reducing the general appearance of the head to tangible characters represents a problem not solved in the course of this work. It is a problem rendered more difficult by the difference in head shape between male and female. The writer has found the width of the ocellocular area (Plate 1, fig. 2) to be useful in certain descriptions. This distance is measured along a line across the top of and tangential to the first antennal segment, from inner margin of eye to the inner margin of the antennal base.

LITERATURE

Full bibliographic references are not given in the text or in the species lists. Instead, references are made to the appropriate citation in "Bibliography of the Homoptera," by Z. P. Metcalf (1942a), which may be consulted for the full reference. In the species lists, the reference to the bibliography is followed by a colon, followed in turn by the page number on which the original description of the species occurs. In the case of references not included in the Metcalf bibliography, the bibliography at the end of the present paper should be consulted.

In those instances where the original description was not verified by the writer, Oman's (1949a) work has been followed, usually, and these references have been indicated ("*fide* Oman") in the species lists.

PROCEDURE

An attempt has been made to study as many species as possible, comparing them with the types of the genera, and placing them accordingly, describing new genera where such a course was indicated. The genera have been as completely characterized as possible. Where some characters have appeared of unusual value in diagnosis, they have been italicized in the descriptions.

Except in the case of the types of genera, no particular effort has been made to discover synonyms, and doubtless several of these occur in the lists of species which accompany the genera. Except in a few cases, varieties have not been listed.

CLASSIFICATION

KEY TO TRIBES OF TYPHLOCYBINAE

1. Fore wing with an appendix.....Alebrini
Fore wing without an appendix..... 2
2. Hind wing with submarginal vein present (except in *Typhlocybella*)
and extending laterad then basad along costa beyond apex of vein
"R + M" Dikraneurini
Hind wing with submarginal vein present or absent at wing apex, when
present not extending beyond apex of posterior branch of R (or
"R + M" where fusion occurs)..... 3
3. Vein 1V absent; style with distinct preapical lobe and apical extension Erythroneurini
Vein 1V present; style without distinct preapical lobe and apical extension Typhlocybini

TRIBE ALEBRINI

The species in this tribe all possess both vannal veins in the hind wing. In the fore wing, the fourth apical cell does not attain the wing apex, and an appendix is present, extending to or around the wing apex. Discal macrosetae are nearly always present on the pygofer, and usually a small group of microsetae occurs on the disc near the outer basal angle of the male plate. The styles usually lack a preapical lobe, and in those species in which the lobe is present, the narrower more caudad remainder of the style is seldom clearly of the nature of an extension as it usually is in other tribes where this feature is present. The style is more intimately fused with the male plate than in other tribes, rendering dissection more difficult. The male plates are usually rolled apically, presenting a tubular appearance in cleared specimens. In macerated specimens, the *bulbus ejaculatorius* and the duct leading from it to the genital atrium are nearly always preserved.

The submarginal vein of the hind wing is usually close to, and often confluent with the apical wing margin, and it is wanting occasionally.

In all species of this tribe, in cleared specimens, the mid-dorsal line of the genital capsule appears membranous to the apex of the preceding segment, or if sclerotized medially near the base of the ninth segment, then the sclerotization appears to be secondary, arising in the membranous portion, which is visible laterally. In all other tribes, the sclerotization is continuous from pleural region to pleural region of the ninth segment, over the dorsum, although the dorsal arch of sclerotized integument may be only a narrow basal band.

KEY TO GENERA OF THE TRIBE ALEBRINI

1. Head short, broad, enclosing pronotum nearly to its hind margin; male plates very long, greatly exceeding tip of pygofer; pygofer lacking setae over disc *Hadralebra*
 Head not unusually broad; male plates not greatly exceeding tip of pygofer; pygofer with setae usually present on disc (exception: *Balera*, *Rhabdotelebra*) 2
2. Fore wing with two longitudinal veins confluent proximad of bases of apical cells 3
 Fore wing without confluent longitudinal veins proximad of apical cells (longitudinal veins occasionally connected by a cross vein) 4
3. Fore wing with veins M and Cu confluent proximad of apical cells *Aphanalebra*
 Fore wing with veins R and M confluent proximad of bases of apical cells *Rabcla*
4. Fore wing with only three apical cells as result of fusion of second and third apical veins *Kallebra*
 Fore wing with four apical cells; second and third apical veins never completely fused 5
5. Hind wing with Cu₂ confluent with submarginal vein at point distad of apparent forking of Cu₁ *Orsalebra*
 Hind wing with Cu₂ confluent with submarginal vein at point opposite to or proximad of apparent forking of Cu₁ 6
6. Aedeagal shaft, in dorsal aspect, broadly inflated throughout its length; style apex strongly sigmoid *Balera*
 Aedeagal shaft, in dorsal aspect, not strongly inflated throughout its length; style apex straight or occasionally sinuate, not strongly sigmoid 7
7. Aedeagus, in lateral view, appearing bifurcate at apex, *Diceratalebra*
 Aedeagus, in lateral view, not appearing bifurcate at apex 8
8. Connective membranous 9
 Connective, at least partially, heavily sclerotized 10
9. Fore wing with apex of cell R broadly expanded, much broader than cell M; aedeagus with single median ventral atrial process *Trypanalebra*
 Fore wing with apex of cell R not broadly expanded, not or slightly broader than cell M; aedeagus without ventral atrial process *Paralebra*
10. Head not distinctly produced medially, in dorsal aspect, its anterior and posterior margins subparallel; eyes massive, the median length of crown exceeding distance between eyes 11
 Head distinctly produced medially, the margins not subparallel, or if so, then eyes small and the median length of crown much less than distance between eyes 12
11. Fore wing with appendix extending completely around apex *Alebra*
 Fore wing with appendix not extending around apex *Brunerella*
12. Fore wing with apex of cell M transverse, occurring distad of basal third of inner apical cell 13
 Fore wing with apex of cell M oblique or angular, or if transverse, then occurring opposite basal third of inner apical cell 14

13. Base of outer apical cell nearly opposite apex of cell R; aedeagus in lateral aspect, with width of unpaired ventral process (rarely absent) greatly exceeding width of midpoint of shaft *Habralebrea*
 Base of outer apical cell much proximad of apex of cell R; unpaired ventral aedeagal process, when present, narrower than shaft *Elabra*
14. Pygofer with submarginal macrosetae grouped very near postero-dorsal margin; aedeagus in lateral aspect with apodeme saddle-shaped *Rhabdotalabrea*
 Pygofer with discal macrosetae; aedeagal apodeme not saddle-shaped in lateral aspect 15
15. Pygofer hooks various in origin, but not dorsal *Protalebrea*
 Pygofer hooks dorsal in origin *Protalebrella*

Genus *Hadralebrea*, nov.

(Pl. 4, fig. 16)

Type of the genus, *Dikraneura* (*Hyloidea*) *laticeps* Osborn.

Hind wings: submarginal vein present, extending at least to apex of wing; vein Cu_1 apparently branched apically (*i. e.* its apical portion not fused with M_{3+4}); vein Cu_2 confluent with submarginal vein at point proximad of vein m-cu.

Fore wings: fourth apical cell short, subtrapezoidal; other apical cells successively shorter towards commissural margin.

Genital capsule: male plates greatly elongate, *greatly exceeding tip of pygofer, without macrosetae; pygofer lacking setae over disc; pygofer hooks ventral in origin.*

Internal male genitalia: style short, broad, flattened dorsoventrally, without preapical lobe or apical extension; connective massive, plate-like, its anterior margin broadly convex, its apex extending nearly as far caudad as style apices, the aedeagal articulation terminal in a socket; aedeagus with preatrium very long, shaft very short.

The head is conspicuously broader, in dorsal aspect, than the rest of the body, and surrounds the pronotum laterally except for the apical portions of the lateral margins.

This genus is unique, among those studied, in genital structure, and has several features which may be considered primitive, especially the form of the tips of the styles. Unfortunately the wing venation cannot be completely described, because the single specimen of the type species possessed only wing fragments.

The genus is known only from the type species, from Bolivia.

Hadralebrea laticeps (Osborn), 1928a: 277 (*Dikraneura* [*Hyloidea*]), new combination

Genus *Aphanalebra* McAtee

(Pl. 4, fig. 17)

Protalebra (*Aphanalebra*) McAtee. Journ. New York Ent. Soc., vol. 34, p. 152. 1926, new status.

Type of the genus, *Protalebra unipuncta* Baker, by original designation.

Hind wings: vein 1V branching from vein 2V near its base; submarginal vein confluent with apical wing margin; posterior branch of R and M_{1+2} not confluent, separate throughout their length, connected by a preapical cross vein; vein Cu_1 appearing branched apically; vein Cu_2 attaining submarginal vein near middle of wing, much basad of vein m-cu.

Fore wings: appendix not extending around wing apex; first apical cell longer than other apical cells, slender, much broader at base than at apex; second apical cell angular basally, petiolate, with sides subparallel; third apical cell very small, triangular, long-petiolate; fourth apical cell open basally, extending apicad nearly to wing apex; *veins M and Cu fused basad of base of first apical cell*; wing apex smoothly rounded.

Genital capsule: male plate elongate, slender, in ventral aspect with lateral margin gradually tapered on apical half to rounded apex; in lateral aspect plate exceeding pygofer and with oblique row of macrosetae over apical half, with group of close-set microsetae below lateral margin near middle its length, and several irregularly arranged microsetae more distad; pygofer, in lateral aspect, with oblique row of macrosetae over disc and cluster of similar setae above posteroventral margin, a small group of ventral microsetae above basal third of male plate; posteroventral pygofer margin extending mesad as thick process bifid at extremity.

Internal male genitalia: style without preapical lobe or apical extension, in dorsal aspect gradually narrowed posteriorly to convexly truncate apex, apical fifth slightly curved laterad; connective membranous; aedeagus with unilateral apodemal process on left side, nearly as long as shaft, the process extending directly ventrad, then curved and directed posterodorsad, shaft in lateral aspect sharply decurved at extreme apex, bisinuate basad of recurved portion, apodeme Y-shaped, dorsal portion of atrium attached ventrally near origin of stem of "Y"; gonoduct with curious tightly-coiled appearance in apical two-thirds, preatrium wanting.

The head, in dorsal aspect, is much narrower than the pronotum, and well produced medially, longer medially than next the eye. The anterior margin is broadly rounded. The median length of the

pronotum is at least twice the median length of the crown, with lateral margins greatly divergent posteriorly and posterior margin shallowly emarginate. In lateral aspect, the face is flat, its contour strongly divergent from the line of the dorsum. The pleural portion of the pronotum is much broader than the ocellocular area.

The type species is from Brazil.

Aphanalebra unipuncta (Baker), 1899b: 404 (*Protalebra*)

Genus *Rabela*, nov.

(Pl. 5, fig. 18)

Type of the genus, *Protalebra tabebuiae* Dozier.

Hind wings: vein IV branching from vein 2V near its mid-point; submarginal vein wanting apically; longitudinal veins not attaining wing apex; posterior branch of R and M_{1+2} concurrent for a short distance preapically, separate apically, the free part of the posterior branch of R only a short spur; vein Cu_1 appearing branched apically; vein Cu_2 confluent with submarginal vein near middle of wing, much basad of vein m-cu.

Fore wings: appendix not extending around wing apex; *veins R and M concurrent before inner basal angle of outer apical cell*, all apical veins thus arising from cell M; first and second apical cells long, slender, the first much broader than second; third apical cell long-stalked; outer apical cell longer than broad, pentagonal, not attaining wing apex.

Genital capsule: male plate with oblique double row of macrosetae on disc, in lateral view with small group of microsetae near lateral margin on basal half, and irregularly arranged smaller microsetae over apical half; pygofer, in lateral view, with group of submarginal macrosetae paralleling dorsal margin preapically, two smaller setae within ventrolateral margin and small group of microsetae just dorsad of outer basal angle of male plate; pygofer hook arising from posterior lobe of pygofer, directed dorsocaudad.

Internal male genitalia: style narrowed basally and apically, broadened on middle half its length, preapical lobe well developed, apex narrowed and directed posterolaterally, obliquely truncate apically; connective Y-shaped, the aedeagal articulation terminal; aedeagus with elongate preatrium, shaft long, slender, curved in large arc, the apex directed cephalad above the dorsal apodeme; dorsal apodeme with pair of flattened divergent processes, aedeagal shaft lacking processes.

The anterior margin of the head, in dorsal aspect, is paraboloid,

the median length exceeding the distance between the eyes. The head, including the eyes, is narrower than the broadest portion of the pronotum. In lateral aspect, the crown is sharply rounded to the face, which is convex on its upper half. The pronotum is short and broad, the lateral margins strongly divergent posteriorly, the posterior margin scarcely emarginate. The width of the pleural portion of the pronotum exceeds the width of the ocellocular area.

The type species is from Cuba, and is the only species representing this genus seen by the writer.

Rabela tabebuiae (Dozier), 1927b: 260 (*Protalebra*), new combination
bicincta Osborn, 1928a: 259 (*Protalebra*), new synonymy

Genus *Kallebra* McAtee

(Pl. 5, fig. 19; Pl. 6, fig. 20)

Protalebra (*Kallebra*) McAtee. Journ. N. Y. Ent. Soc., vol. 34, p. 152. 1926, new status.

Type of the genus, *Protalebra ninettae* Baker, by original designation.

Hind wings: vein IV branching from vein 2V near its base; submarginal vein present (its apical extent undetermined); posterior branch of R touching M_{1+2} preapically, then diverging, the two veins extending separately towards wing apex; vein Cu_2 confluent with submarginal vein at point much basad of apparent forking of vein Cu_1 .

Fore wings: appendix not extending around wing apex; *only three apical cells present* (probably as result of fusion of second and third apical veins); inner apical cell much longer than other two, the three apical cells, measured near mid-length of central one, approximately equal in width; outer apical cell subequal in length to central apical cell; cell M much broader than cell R.

Genital capsule: male plate, in ventral aspect, broad on basal half, outer margin strongly converging towards mesal margin on apical half to sharply rounded apex, with submarginal row of macrosetae paralleling lateral margin over third quarter of length, with basal lateral internal broad heavily-sclerotized thickening along lateral margin on basal half and extremely heavily sclerotized point at apex of thickening near middle of length of plate; in lateral aspect, plate with microsetae dispersed over apical half, plate extending as far distad as apex of pygofer; pygofer with submarginal group of few microsetae near ventral margin and few

macrosetae on disc; pygofer hook weak, arising from ventral pygofer margin and extending posteromesad.

Internal male genitalia: style, in lateral aspect, without preapical lobe, but with distinct apical extension, in dorsal aspect with obliquely truncate apex; connective membranous; aedeagus with well-developed dorsal apodeme giving off two slender elongate processes nearly as long as shaft, shaft slender, elongate slightly decurved apically; preatrium wanting.

The head is well produced medially, the median length greatly exceeding the width between the eyes, and nearly equal to that of the pronotum. In dorsal aspect, the anterior margin of the head appears nearly right-angled, with the apex rounded. The lateral margins of the pronotum are divergent posteriorly, and the posterior margin is shallowly concave. In lateral aspect, the face is smoothly and slightly convex, its contour strongly divergent from that of the dorsum. The width of the pleural portion of the pronotum exceeds the width of the ocellocular area.

The genus is known only from the type species, from Brazil.

Kallebra ninettae (Baker), 1899b: 403 (*Protalebra*)

Genus *Orsalebra*, nov.

(Pl. 6, fig. 21; Pl. 7, fig. 22)

Type of the genus, *Orsalebra robusta*, n. sp.

Hind wings: vein IV branching from 2V near its midpoint; submarginal vein extending around wing apex and distinct from apical margin, continued beyond apex of posterior branch of R along costal margin towards base of wing, becoming evanescent near mid-costal margin; posterior branch of R separate from M_{1+2} apically, but connected with it by a preapical cross vein; vein Cu_1 apparently branched apically; vein Cu_2 attaining submarginal vein at point distad of vein m-cu.

Fore wings: appendix extending around wing apex; bases of first, second, and third apical cells transverse, these cells successively shorter towards costal margin; outer apical cell open at base; second apical cell with lateral margins subparallel; third apical cell broader apically than at base.

Genital capsule: male plate, in ventral aspect, broad basally, abruptly narrowed on outer margin at apical third, apex broadly rounded, disc of basal two thirds with sparse weak macrosetae, similar setae limited to mesal portion on apical third; pygofer in lateral aspect with middle of posterior margin produced posteriorly,

with sclerotized subquadrate thickening at its apex, with few macrosetae on posterior portion of disc before apical sclerotization and small group of microsetae near center of disc dorsad of outer basal angle of male plate.

Internal male genitalia: style elongate, slender, in lateral aspect with distinct preapical lobe and slender dorsal apical extension directed dorsomesad; connective U-shaped, the closed end dorsal, its plane forming right angle with plane of long axis of styles; aedeagal articulation on posterior face of closed end of connective; aedeagus in lateral view with elongate preatrium; in dorsal view with shaft curved gradually dorsad to near apex, then posteroventrad, extreme tip truncate, shaft broadly grooved on dorsal face from base to beginning of ventrally curved apical portion, the groove there replaced by dorsal carina retrorse at base, flanked by two similar lateral carinae, shaft with pair of laterally extending once-forked processes arising from its sides, each of the branches pectinate in appearance; in lateral view, the forked shaft processes arising just basad of an unpaired shaft process which lies closely appressed to the shaft apically and bears the three carinae already described; dorsal apodeme forked near tip, well developed.

This strange genus appears to be related to *Alebra* and has several characters which suggest an affinity with the Dikraneurini: the venation of the fore wings, the venation of the hind wings (except the unfused posterior branch of R and M_{1+2}) especially the position of the confluence of Cu_2 with the submarginal vein, and the apical extension of the styles. It may stand along the line, which leads to the Dikraneurini. Only the type of the genus is known, at present.

Orsalebra robusta, n. sp.

Form: General form broad, robust; head including eyes subequal in width to greatest width of pronotum, but little produced, median length of crown only small fraction of width between eyes, apex broadly rounded, crown broadly rounded to face; face in profile slightly concave above middle its length; ocelli present, slightly closer to eyes than to each other; pronotum broader than long, lateral margins divergent posteriorly, humeral angles broadly rounded, posterior margin shallowly emarginate, width of pleural portion of pronotum slightly exceeding width of ocellocular area; female sternite VII considerably produced medially, broadly convex laterally. Wings, male genital capsule and internal male genitalia as in generic description above.

Color: Dorsum pale yellowish white, a pair of faint spots around

each ocellus, three longitudinal discal pronotal vittae over basal two-thirds, basal angles of scutellum and apex except extreme tip, a claval vitta paralleling claval suture and a corial vitta parallel to this, a second corial vitta fainter and parallel to radial margin, pale yellow to orange; extreme tip of clavus and small portion of adjoining appendix deep, apex of brachial cell and bases of apical cells paler, black; face with suggestion of two yellow markings at base; remainder of venter stramineous except dark tarsal claws.

Described from male holotype and female allotype specimens from Hda. Talahua Bolivar, Ecuador, collected at an altitude of 3100 M. by F. M.- and H. H. Brown. Types in Snow Entomological Collections.

Genus *Balera*, nov.

(Pl. 7, fig. 23)

Type of the genus, *Dikraneura pellucida* Oshorn.

Hind wings: submarginal vein present, distinct from apical wing margin, confluent with apex of posterior branch of R; posterior branch of R and M_{1+2} not confluent, vein Cu_1 appearing branched apically; vein Cu_2 confluent with submarginal vein at point much basad of cross vein m-cu.

Fore wings: appendix not extending around wing apex; all apical cells much longer than broad, their bases angulate except inner apical cell which is oblique at base; inner apical cell much broader than other apical cells; third apical cell not stalked; *outer apical cell extending distad nearly to wing apex*; apex of cell M angulate, occurring opposite basal third of inner apical cell.

Genital capsule: male plate, in lateral aspect with group of macrosetae forming double row on disc of basal half, apical half with sparsely arranged microsetae; lateral margin near base with irregular row of microsetae; pygofer *without macrosetae on disc* but with a submarginal row of these occurring parallel to postero-dorsal margin, a small group of microsetae on disc dorsad of outer basal angle of male plate; pygofer hook directed mesad, not differentially sclerotized.

Internal male genitalia: style, in lateral view, short, with distinct preapical lobe, apex curved dorsad with few setae along posterior margin then sharply ventrad, *the apical half of the style thus appearing sigmoid*; connective V-shaped, turned dorsad at extreme apex, the aedeagal articulation subterminal; aedeagus inflated, preatrium and dorsal apodeme weak, shaft keeled laterally, the keels widened apically forming pair of dorsolaterally extended membranous lobes, these continuous through a similar ventral

apical lobe extending distad from ventral margin of transverse gonopore.

The head, in dorsal aspect, is broadly triangular, with the apex obtusely angular. Its width, including the eyes, is greater than the width of the pronotum. The median length of the crown is subequal to the width between the eyes. In lateral aspect, the crown is rounded to the face, which is flat except for a slight concavity near its middle. The pronotum is narrow, the lateral margins subparallel, the posterior margin shallowly emarginate. The pleural portion of the pronotum is much wider than the ocellocular area.

The type of the genus is from Bolivia.

Balera pellucida (Osborn), 1928a: 271 (*Dikraneura*), new combination.

Genus *Diceratalebra*, nov.

(Pl. 7, fig. 24; pl. 8, fig. 25)

Type of the genus, *Alebra sanguinolinea* Baker.

Hind wings: vein IV branching from vein 2V near its midpoint or slightly more proximad; submarginal vein present, confluent or not with apical wing margin; posterior branch of R and M_{1+2} fused for a short distance preapically or not, separate apically; vein Cu_1 appearing branched apically; vein Cu_2 confluent with submarginal vein at point basad of vein m-cu.

Fore wings: appendix present, extending around apex of wing (*interrogata*) or not; inner apical cell broad basally, much narrower on apical half; second apical cell narrow basally with lateral margins nearly parallel; third apical cell sessile or petiolate; outer apical cell short, not attaining wing apex, its length slightly exceeding its width; cell R extending more distad than cell M; cell M with oblique or obliquely angular apex.

Genital capsule: male plate, in ventral aspect, elongate, slender, gradually tapered to abruptly rounded apex, with single row of macrosetae over apical two thirds (middle two fourths in *robusta*), extending obliquely from disc distad to and along mesal margin; in lateral aspect with numerous irregularly arranged microsetae between these and lateral margin; pygofer produced posterodorsad, with single vertical row of macrosetae, and with group of microsetae just dorsad of outer basal angle of male plate; *pygofer hook arising along posteroventral margin or on disc near margin quite distant from base of male plate*, directed posteroventrad or posterodorsad.

Internal male genitalia: style short, without distinct preapical lobe or apical extension, curved slightly laterad at apex; connective heavily sclerotized and trapezoidal, or membranous; *aedeagus short, laterally compressed, appearing bifid at apex*, but with the dorsal ramus comprising the shaft and bearing the gonoduct, the ventral ramus actually a ventral process of the shaft.

The head is distinctly produced medially, with the apex rounded, in dorsal aspect. The median length of the crown is equal to, or exceeds, the width between the eyes, but is less than the median length of the pronotum. The lateral margins of the pronotum are sharply divergent posteriorly, and the posterior margin is shallowly concave. In lateral aspect, the contour of the face is convex, and strongly divergent from the line of the dorsum. The pleural portion of the pronotum is broader than the ocellular area. Ocelli are present.

The genus is Neotropical in distribution.

Diceratalebra cubana (Osborn), 1928a: 261 (*Protalebra*), new combination
Diceratalebra interrogata (Knull), 1940b: 291 (*Alebra*), new combination
Diceratalebra sanguinolinea (Baker), 1903d: 5 (*Alebra*), new combination
Diceratalebra robusta (Gillette), 1898a: 712 (*Alebra*), new combination

Genus *Trypanalebra*, nov.

(Pl. 8, fig. 26)

Type of the genus, *Protalebra maculata* Baker.

Hind wings: vein IV branching from vein 2V at its midpoint or more proximad; submarginal vein present, confluent with apical wing margin; posterior branch of R not confluent with vein M_{1+2} ; vein Cu_1 appearing branched apically, the apparent forking near middle of wing; vein Cu_2 confluent with submarginal vein near middle of wing occasionally nearly opposite vein m-cu.

Fore wings: appendix not extending around wing apex; inner apical cell longer than second, not conspicuously wider at base than at apex; second apical cell slender, parallel-sided, in width equalling or exceeding inner apical cell; third apical cell triangular, petiolate or not at base; outer apical cell short, trapezoidal, not attaining wing apex, its width nearly or entirely equal to its length; cell R extending farther distad than cell M and expanded apically, its expanded apex usually in contact with all the apical cells; wing apex smoothly rounded.

Genital capsule: male plate, in ventral aspect, slender, gradually tapering to sharply rounded apex, with single row of macrosetae over apical two thirds, parallel to lateral margin, irregularly ar-

ranged except a close-set group at about basal third of length of plate; pygofer, in lateral aspect, with vertical or oblique row of macrosetae over disc, and small group of microsetae just dorsad of outer basal angle of male plate, posterior pygofer margin distinct, or poorly delimited from ventral margin; posterior pygofer margin inrolled and giving rise to short pygofer hook; anal hooks wanting.

Internal male genitalia: style short, without preapical lobe or conspicuous apical extension, in lateral aspect with apex decurved and acute; connective membranous; aedeagus laterally compressed, preatrium wanting, shaft short, directed posterodorsad, giving off pair of dorsal processes along its length; single median atrial process arising ventrally and extending far beyond apex of shaft.

The leafhoppers of this genus are small, and marked with yellow and black, and with a dark saddle across the middle of the dorsum. The head, including the eyes, is narrower than the pronotum. In dorsal aspect, the anterior margin of the head is broadly rounded. The distance between the eyes greatly exceeds the median length of the crown which is much less than the median length of the pronotum. The lateral margins of the pronotum are greatly divergent posteriorly, and the posterior margin is shallowly concave. The pleural portion of the pronotum is broader than the ocellocular area. Ocelli are present.

The genus is Neotropical and Sonoran in distribution. In addition to the genotype, the writer has examined an undescribed species from Arizona.

Trypanalebra maculata (Baker), 1903d: 6 (*Protalebra*), new combination

Genus *Paralebra* McAtee

(Pl. 9, fig. 27)

Protalebra (*Paralebra*) McAtee. Journ. New York Ent. Soc., vol. 34, pp. 147, 151. 1926, new status.

Protalebra (*Plagalebra*) McAtee. *op. cit.*: pp. 147, 150, 1926, new synonymy.

Type of the genus, *Protalebra similis* Baker, by original designation.

Hind wings: vein IV branching from vein 2V basad of its midpoint; submarginal vein confluent with apical wing margin; posterior branch of R not confluent with vein M_{1+2} ; vein Cu_1 appearing forked apically; vein Cu_2 confluent with submarginal vein near midpoint of wing, basad of cross vein m-cu.

Fore wings: appendix not extending around wing apex; inner apical cell much broader in basal half than at apex; second apical

cell longer than broad; third apical cell stalked, its apex scarcely attaining wing apex; outer apical cell short, trapezoidal, not attaining wing apex; cell R extending more distad than cell M; cell M simple or possessing a cross vein (*singularis*).

Genital capsule: male plate, in ventral aspect, gradually narrowed to sharply rounded apex, in lateral aspect with oblique group of macrosetae over middle two fourths, with numerous irregularly arranged microsetae laterad and distad of these; pygofer with vertical row of discal macrosetae and group of microsetae near ventral margin, posterior margin produced or truncate, with ventral weak pygofer hook consisting of differentially sclerotized portion of pygofer wall, with or without additional digitate undifferentially-sclerotized process.

Internal male genitalia: style without preapical lobe or apical extension, its apex gently curved mesad or laterad; connective membranous; aedeagus with elongate heavily sclerotized atrial rim in form of inverted U, the dorsal closed portion expanded somewhat to form the apodeme, with pair of atrial processes arising dorsally or ventrally, extending laterad or parallel to aedeagal shaft; shaft elongate-campanulate, the apex turned slightly dorsad, without processes.

The head, in dorsal aspect, is well produced, rounded or angular at apex, with the crown flat or slightly concave. The pronotum is much broader than long, and broader than the head, including the eyes. The lateral margins of the pronotum are divergent posteriorly, and the posterior margin is concave. In lateral aspect, the contour of the face is flat or shallowly concave, and sharply divergent from the line of the dorsum. The pleural portion of the pronotum is much broader than the ocellocular area.

The genus has a Neotropical distribution. In addition to the species listed here, an undescribed Cuban species has been examined.

Paralebrea similis (Baker), 1899b: 403 (*Protalebrea*), new combination

Paralebrea singularis (Baker), 1899b: 402 (*Protalebrea*), new combination

Genus *Alebra* Fieber

(Pl. 9, fig. 28; Pl. 10, fig. 29)

Alebra Fieber. Katalog der Europäischen Cicadinen, p. 14. 1874.

Type of the genus, *Cicada albostriella* Fallén, by subsequent designation of Oshanin (Kat. Pal. Hemip., p. 111, 1912).

Hind wings: vein IV branching from vein 2V near its midpoint; posterior branch of R not fused with vein M_{1+2} ; vein Cu_1 appearing

branched apically; submarginal vein extending around wing apex and confluent with extremity of posterior branch of R; vein Cu_2 confluent with submarginal vein opposite vein m-cu.

Fore wings: appendix present, extending around wing apex; first, second and third apical cells subequal in length, the first slightly wider than either second or third; outer apical cell open basally; pattern formed by bases of apical cells nearly an unbroken transverse line.

Genital capsule: male plate with fairly numerous macrosetae arranged in linear group along mesal margin, a small group of coarse short macrosetae on lateral margin on middle third, a close-set cluster of setae on dorsal face of apex of plate, several microsetae on disc and on lateral margin on apical half; pygofer, in lateral view, with bilobed posterior margin, the dorsolateral lobe short, bearing sparse short setae, the ventrolateral lobe longer and bearing an anteapical group of macrosetae and a few discal microsetae.

Internal male genitalia: style elongate, without preapical lobe or apical extension, with small lobate ventral extension slightly distad of articulation with connective, apex acute, smoothly and sharply curved ventrad; connective triangular, the aedeagal articulation terminal; aedeagus with preatrium distinct, atrium small, dorsal apodeme well developed, shaft elongate, slender, without ornamentation or processes, gonopore terminal; shaft asymmetrical in ventral aspect as result of curvature to one side; anal hooks and pygofer processes wanting.

The head, including the eyes, is narrower than the pronotum. The median length of the crown is less than the width between the eyes. The anterior and posterior margins of the crown are subparallel. In lateral aspect, the crown is broadly rounded to the convex face. The pronotum is long, greatly exceeding in length the median length of the crown. The lateral margins are divergent posteriorly, the posterior margin shallowly emarginate. The pleural portion of the pronotum is considerably wider than the ocellocular area.

The North American specimens of the type species which have been dissected revealed constant difference from an European specimen from Hungary, which agreed fairly well with a French specimen illustrated by Ribaut. Several North American specimens were dissected and found to be identical in structure of genital capsule and internal male genitalia. The specimen figured is one of the North American forms. In the European forms

(*vide* Ribaut 1936), the lower of the two posterior pygofer lobes arises further ventrad on the posterior margin, and the dorsal aedeagal apodeme is slightly different. It seems doubtful to the writer that such differences, though constant in the specimens studied, are indicative of specific differences between Palaearctic and Nearctic forms.

From the Western Hemisphere, only the type of the genus is known.

Alebra albostriella (Fallén), 1826a:54 (*Cicada*) (*fide* Oman)

Alebra dorsalis Gillette was examined and found to be non-typhlocybinae. Dr. Oman kindly examined the type and stated that it belongs in Deltocephalinae, near the genus *Atanus*.

Genus *Brunerella*, nov.

(Pl. 10, fig. 30; pl. 11, fig. 31)

Type of the genus, *Brunerella magnifica*, n. sp.

Hind wings: vein 1V branching from vein 2V basad of its mid-point; submarginal vein present, *extending to wing apex and confluent with apex of vein* M_{1+2} ; posterior branch of R represented by a long spur; vein Cu_1 appearing branched apically; vein Cu_2 confluent with submarginal vein considerably basad of vein m-cu.

Fore wings: appendix not extending around wing apex; first, second, and third apical cells slender and progressively shorter in that order, their margins subparallel; outer apical cell trapezoidal, not attaining wing apex; inner apical cell slightly wider than either second or third apical cell; cell M with apex transverse, occurring opposite basal third of inner apical cell.

Genital capsule: male plate, in ventral aspect, with diagonal row of macrosetae across distal portion of basal third, and a similar row along mesal margin nearly to apex, outer margin abruptly narrowed beyond basal third, then parallel to inner margin to rounded apex; in lateral aspect, plate with group of small submarginal setae slightly distad of outer basal angle, a row of stout microsetae near to and paralleling lateral margin over distal half, disc with sparse microsetae; pygofer, in lateral aspect, slightly emarginate posterodorsally and with well-produced posterior lobe, disc with a few preapical macrosetae and with short stout microsetae located above lower part of oblique posteroventral margin; pygofer hooks and anal hooks wanting.

Internal male genitalia: style, in broad aspect, biramous basally, the connective articulating between the arms, outer margin nearly

straight, slightly expanded preapically, inner margin bisinuate, then narrowing obliquely and slightly concavely to blunt apex; connective narrow, its anterior margin shallowly angulate at center, the aedeagal articulation membranous; aedeagal shaft with preatrium short (disregarding membranous articular portion), a pair of apodemes arising from lateral atrial margin, sharply curved dorsad and mesad; shaft simple, tubular, unornamented, without processes.

The head is short and robust, the eyes massive. Ocelli are present.

This genus is dedicated to Dr. S. C. Bruner, of the Department of Phytopathology and Entomology of the Cuban Ministry of Agriculture, who has been most co-operative and who has collected some specimens in the type series.

Brunerella magnifica, n. sp.

Form: Head, including eyes, subequal in width to greatest width of pronotum, in dorsal aspect with apex broadly rounded before eyes, scarcely produced, the median length of crown more than double width between eyes; in profile with crown broadly rounded to convex face, with ocelli on margin between eyes, not visible from above, nearly touching mesal margins of compound eyes; pronotum short, median length about half width, lateral margins slightly divergent posteriorly, posterior margin shallowly concave, pleural portion not broad but in width greatly exceeding narrow ocellocular area; scutellum broadly exposed; abdomen heavily sclerotized; female sternite VII gradually produced medially in rounded posterior projection, the posterior margin sinuate each side of this; male plates and female pygofer lacking conspicuous dark macrosetae. Wings, genital capsule, and internal male genitalia as in generic description.

Color: Crown of head ivory white, with an irregular orange "V" in center, the arms broadly touching the eyes; pronotum sanguineous, except posterior margin medially which is slate-gray, with dark border between red and gray portions laterally, pleural portion of pronotum red above lower extremity; scutellum greenish yellow, a slender dark transverse line just before extreme apex; fore wings pruinose, a pale brick-red streak along costa near base, an angulate broad sanguineous vitta, its apex directed mesad, in basal half of clavus, and contiguous red spot in adjacent corium, the posterior margin of both narrowly edged in black; apical half of clavus except extreme tip and inner half of adjacent corium amber, the corial portion continuing caudad, becoming fumose, and broadening to cover apical cells except few slate-gray fenestrae and brick-red apical veins; base of outer apical cell fumose next costal margin, face and

legs ivory; hind tibiae narrowly embrowned apically; female pygofer black with pale setae.

Holotype male, allotype female and paratype male from 30 miles east of Jalapa, Mexico, collected December 31, 1949 by Dr. R. H. Beamer, in Snow Entomological Collections. Eight male specimens examined from Almandares River near Havana, Cuba, collected December 11, 1931 by Dr. S. C. Bruner on *Bourreria succulenta*, in collection of Dr. Bruner.

The Cuban specimens differ in color to a considerable degree from the Mexican ones, although the genitalia appear identical. In the Cuban material, the red color of the anterior portion of the pronotum invades the more posterior gray portion in a large median tooth which extends nearly to the base of the pronotum, while the dark gray between the red and gray on the pronotum is more pronounced than in the Mexican form. The angular red markings of the anterior part of the fore wing are deeper red and more extensive, forming a deep red line across the basal fourth of the wing except hyaline areas, one adjoining scutellum on each wing, and one on each wing astride claval suture, this transverse line bordered behind with dark. The amber yellow of the central part of the wings extends completely across both wings nearly as far distad as the apex of the clavus. The wing apices are more deeply dark and the dark marking extends cephalad to include the tip of the clavus.

Genus *Habralebra*, nov.

(Pl. 11, fig. 32)

Type of the genus, *Protalebra nicaraguensis* Baker.

Hind wings: vein IV branching from vein 2V near its base; submarginal vein present, nearly confluent with wing apex to apex of vein M_{1+2} ; posterior branch of R not confluent with vein M_{1+2} (posterior branch of R evanescent apically in type species); vein Cu_1 appearing branched apically; vein Cu_2 confluent with submarginal vein at point considerably proximad of vein m-cu.

Fore wings: appendix not extending around wing apex; first, second, and third apical cells elongate, slender, the inner longer than either the second or third; outer apical cell short, not attaining wing apex, its base nearly opposite apex of cell R; cell M with apex transverse and occurring distad of basal third of inner apical cell, wider apically than cell R.

Genital capsule: male plate with oblique single row of macrosetae over middle third its length, or more extensive, extending along

mesal margin apically to near apex of plate, microsetae arranged variously; pygofer, in lateral aspect, with posterior margin produced, with single row of macrosetae over disc and group of microsetae dorsad of basal third of male plate, *with ventral margin rolled mesad and often giving rise to posteriorly directed pygofer hook*; anal hooks wanting.

Internal male genitalia: style various in form, apex curved gradually laterad; connective papilionaceous, Y-shaped, or occurring as a cross-bar, the apical portion occasionally turned dorsad, the aedeagus then joined to connective by a membranous connection; aedeagus, in lateral view, with elongate preatrium or none, dorsal apodeme well developed, Y- or T-shaped, *atrium giving rise to single ventral process which is thicker than apical half of long tapering shaft*.

The head, including the eyes, is narrower than the pronotum, and deltoid. In dorsal aspect, the median length of the crown exceeds the distance between the eyes. In lateral aspect, the crown is sharply rounded to the face. The pronotum, in dorsal aspect, has the lateral margins slightly divergent posteriorly and is smoothly concave on the posterior margin. The width of the pleural portion of the pronotum very greatly exceeds the width of the ocellocular area. The species examined are pale in color, with dorsal markings of pale yellow and black.

The genus has a Neotropical distribution. It seems to be closely related to *Elabra*.

Several undescribed species from South America have style apices with a distinct preapical lobe and what appears to be an apical extension, the latter broad apically and suggestive of the condition found in *Zygina* in the Erythroneurini. One of the paratypes of *bifasciata*, erroneously designated, has style apices of this sort.

Habralebra amoena (Baker), 1899b: 404 (*Protalebra*), new combination

Habralebra bifasciata (Gillette), 1898a: 711 (*Alebra*), new combination

Habralebra nicaraguensis (Baker), 1903d: 6 (*Protalebra*), new combination

Habralebra trimaculata (Gillette), 1898a: 712 (*Alebra*), new combination

Apparently the type of the genus was described from a single female specimen from San Marcos, Nicaragua. This specimen, in the Pomona College collection, did not bear a type label. A series of specimens of this species, from Mexico, from the D. M. DeLong collection, was examined by the writer.

Genus *Elabra*, nov.

(Pl. 11, fig. 33; pl. 12, fig. 34)

Type of genus, *Protalebra eburneola* Osborn.

Hind wings: submarginal vein present, confluent with apical wing margin and with apex of posterior branch of vein R; posterior branch of R fused with vein M_{1+2} through part of its length or not, the two veins separate apically; vein Cu_1 appearing branched apically; vein Cu_2 confluent with submarginal vein at point basad of vein m-cu.

Fore wings: appendix not extending around wing apex; inner apical cell broader or narrower than second apical cell; third apical cell trapezoidal or triangular, *not stalked*; outer apical cell short, not attaining wing apex, its base considerably basad of apex of cell R; *apex of cell M transverse, not oblique, occurring distad of basal third of inner apical cell.*

Genital capsule: male plate variable between species as to location of setae; pygofer with discal macrosetae, and group of microsetae on disc above outer basal angle of male plate, occasionally with macrosetae or microsetae on posterodorsal margin, and microsetae on posteroventral margin; pygofer hooks present or absent, median or dorsal in origin when present; anal hooks usually poorly developed.

Internal male genitalia: style without preapical lobe or apical extension, slender, tubular, straight or slightly curved at apex; connective in form of large cross-bar (except in *attenuata*); aedeagus with preatrium well developed or absent, *dorsal apodeme well developed* (except in *attenuata*); aedeagus often with pair of short ventral processes along its length.

The species included here are small and delicate in appearance, with elongate heads, the median length of the crown exceeding the distance between the eyes. The face, in profile, is slightly convex. The pleural portion of the pronotum is very broad, exceeding in width the ocellular area.

The distribution is Neotropical.

Elabra attenuata (Osborn), 1928a: 269 (*Dikraneura*), new combination

albidula (Osborn), 1928a: 271 (*Dikraneura*), new synonymy

Elabra eburneola (Osborn), 1928a: 257 (*Protalebra*), new combination

Elabra parallela (Osborn), 1928a: 274 (*Dikraneura*), new combination

Elabra parana (Osborn), 1928a: 268 (*Dikraneura*), new combination

Elabra quadrifasciata (Osborn), 1928a: 272 (*Dikraneura*), new combination

Elabra sarana (Osborn), 1928a: 268 (*Dikraneura*), new combination

Genus *Rhabdotalebra*, nov.

(Pl. 12, fig. 35; pl. 13, fig. 36)

Type of the genus, *Protalebra octolineata* Baker.

Hind wings: vein IV branching from vein 2V near its midpoint; submarginal vein confluent with apical wing margin; posterior branch of R fused with M_{1+2} for a short distance preapically or not, the two veins always separate apically; vein Cu_1 appearing branched apically; vein Cu_2 confluent with submarginal vein near mid-length of wing, much basad of cross vein m-cu.

Fore wings: appendix not extending around wing apex; inner apical cell much broader at base than at apex, longer than other apical cells; second apical cell angular at base (except in *brunnea*); third apical cell petiolate, scarcely attaining wing apex; apex of cell M opposite basal third of inner apical cell.

Genital capsule: male plate, in ventral aspect, slender, gradually tapered, with macrosetae over apical two thirds, or on basal half, their arrangement not uniseriate, in lateral aspect with microsetae irregularly arranged on distal two thirds of plate; *pygofer lacking macrosetae on disc, but with submarginal group near posterodorsal margin*, with microsetae dispersed on disc; posteroventral margin of pygofer inrolled and thickened to form pygofer hook which projects posterodorsad.

Internal male genitalia: style broadened near middle of its length, with apical median extension curved slightly laterad, pre-apical lobe well developed or not; connective heavily sclerotized; aedeagus lacking basal or atrial processes, shaft simple, occasionally with paired terminal processes, preatrium well developed, *apodeme saddle-shaped in lateral aspect*, elongate in axis of base of aedeagal shaft.

In dorsal aspect, the head including the eyes, is narrower than the pronotum, and distinctly produced medially to the rounded apex. The median length of the crown is slightly greater than the median length of the pronotum (exception: *octolineata*). The lateral margins of the pronotum are divergent posteriorly and the posterior margin is shallowly concave. In lateral aspect, the face is slightly convex, its contour sharply divergent from the line of the dorsum. Ocelli are absent.

The genus is Neotropical.

Rhabdotalebra brunnea (Oman), 1937d: 567 (*Protalebra*), new combination
Rhabdotalebra octolineata (Baker), 1903d: 7 (*Protalebra*), new combination
Rhabdotalebra signata (McAtee), 1926b: 148 (*Protalebra*), new combination, new status.

Genus *Protalebra* Baker

(Pl. 13, fig. 37)

Protalebra Baker. *Psyche*, vol. 8: pp. 401, 402. 1899.

Type of the genus, *Alebra curvilinea* Gillette, by original designation.

Hind wings: vein 1V branching from vein 2V near its midpoint or more basad; submarginal vein present, extending around wing apex, confluent with apical wing margin or not, its apex joining apex of posterior branch of R; posterior branch of R confluent with M_{1+2} for a short distance or not; vein Cu_1 appearing branched apically; vein Cu_2 confluent with submarginal vein at point basad of vein m-cu.

Fore wings: appendix not extending around wing apex; first and second apical cells of various forms, the first longer than the second; third apical cell sessile and quadrangular, triangular, or petiolate; outer apical cell short, not attaining wing apex.

Genital capsule: male plate variable as to arrangement of setae; pygofer with group of macrosetae on disc not limited to narrow area along posterodorsal margin; pygofer hooks ventral, posteroventral, or posterior in origin.

Internal male genitalia: style of varied form, usually short, and without preapical lobe or apical extension; connective sclerotized; aedeagus of various forms, preatrium usually well-developed, dorsal apodeme long or short, aedeagal shaft without processes.

At present, this genus is heterogeneous. It includes a considerable variety of forms, as well as those species which have not been studied, or only the females of which have been studied. In the list which follows, the species which have not been studied are prefixed with a single asterisk, while those for which no males have been studied are prefixed with a double asterisk.

**Protalebra apicalis* Van Duzee, 1907a: 74

**Protalebra aureovittata* (DeLong), in Wolcott 1923b: 267 (*Alebra pallida* Osborn, 1928a: 260)

**Protalebra cordiae* Osborn, 1929b: 102

Protalebra curvilinea (Gillette), 1898a: 710 (*Alebra*)

Protalebra decorata (Osborn), 1928a: 255 (*Alebra*), new combination

***Protalebra lenticula* Osborn, 1929b: 103

**Protalebra lineola* Osborn, 1928a: 263

**Protalebra nexa* McAtee, 1926b: 150

Protalebra omega Van Duzee, 1907a: 75

***Protalebra picea* Osborn, 1928a: 265

**Protalebra sabana* Osborn, 1928a: 259

**Protalebra scriptozona* Van Duzee, 1923a: 186

**Protalebra sublunata* (Osborn), 1928a: 289 (*Erythroneura*), new combination

**Protalebra transversalis* Baker, 1903d: 6

Protalebra vexillifera Baker, 1899b: 404

Genus *Protalebrella*, nov.

(Pl. 13, fig. 38; pl. 14, fig. 39)

Type of the genus, *Protalebra brasiliensis* Baker.

Hind wings: vein 1V branching from vein 2V near its midpoint; submarginal vein present, confluent with wing margin at apex; posterior branch of R confluent with vein M_{1+2} for a short distance preapically but separate at apex, or not so confluent; vein Cu_1 appearing branched apically, the apparent forking near middle of discal area; vein Cu_2 confluent with submarginal vein near mid-length of wing, occasionally nearly opposite vein m-cu.

Fore wings: appendix not extending around wing apex; base of inner apical cell not in contact with cell R; second apical cell shorter than inner apical cell, its width at mid-length equalling or exceeding width of adjacent part of inner apical cell; third apical cell triangular or petiolate; outer apical cell broad, short, not attaining wing apex; cells R and M subequal in width at their broadest preapical portions; wing apex obliquely truncate.

Genital capsule: male plate, in ventral aspect, elongate, slender, gradually tapered to sharply rounded apex, with macrosetae throughout its length arranged laterally along margin, or laterally and discally; in lateral aspect, plate with number of microsetae irregularly arranged near lateral margin; pygofer with small group of macrosetae extending from posterodorsal portion of disc to posterodorsal margin, with dispersed group of microsetae just dorsad of outer basal angle of male plate, these occasionally extending dorsad on disc; posterior pygofer margin truncate or produced; *pygofer hook dorsal in origin, internal, directed ventrad*, simple or bifid.

Internal male genitalia: style short, stout, without preapical lobe and without conspicuous hairs or setae; connective sclerotized, in form of cross-bar or "V"; aedeagus with preatrium well developed; shaft short, dorsal apodeme elongate, as long as shaft; shaft and apodeme simple, without processes.

The species of this genus are slender and elongate. The head is narrower than the pronotum. In dorsal aspect, the anterior margin of the head is rounded or subangulate. Except in the genotype, the median length of the crown exceeds the distance between the eyes.

The pronotum is long, its median length exceeding that of the crown. The lateral margins of the pronotum are sharply divergent posteriorly and the posterior margin is shallowly concave. In lateral aspect, the line of the face is convex and sharply divergent from the line of the dorsum. The pleural portion of the pronotum is broader than the ocellocular area.

The genus is Neotropical in distribution.

In addition to the species listed, an undescribed species from Mexico has been examined.

Protalebrella brasiliensis (Baker), 1899b: 405 (*Protalebra*), new combination

Protalebrella terminata (Baker), 1899b: 404 (*Protelebra*), new combination

TRIBE DIKRANEURINI

The tribe is characterized by the presence, in the hind wing, of a submarginal vein which extends around the wing apex beyond the apex of vein "R + M," then basad along the costal margin, although this character is not found in the genus *Typhlocybella*, where apparently the submarginal vein has been lost in an extreme reduction of wing venation. Coupled with this character, except as noted below, is a characteristic development of the style apex which displays a distinct preapical lobe and a mesal apical extension. The extension may appear to arise as a uniform development from the preapical portion, so that there is no clear line of demarcation at its base; or it may arise from the dorsal region of the apex of the preapical portion of the style, and possess a clear line of demarcation at its base; or it may arise from the dorsal face of the style in the region anterior to the preapical lobe. The apical extension is never broad and truncate as in *Zygina*, and there is never a second extension from it as in *Erythroneura*. The extension is conical or cylindrical.

The male plates characteristically possess an oblique group of few macrosetae. The pygofer usually lacks macrosetae, but usually possesses small setae situated posterodorsally on the disc, or along the posterior margin. Pygofer hooks are frequently present, and most often arise dorsally, usually overhanging a posterior pygofer lobe.

The hind wings present evidence of considerable evolution within the tribe, with a tendency towards reduction in size, fusion of veins 1V and 2V, migration of vein Cu_2 towards the vannal fold and away from the apical half of the wing, and the fusion of the apex of vein Cu_1 with vein M_{3+4} . In the more primitive venation, veins 1V and 2V are separate apically, vein Cu_2 is confluent with the submarginal vein in the apical half of the wing, and vein Cu_1 is separate from vein M_{3+4} (Cu_1 appears branched) apically. This venation is found

in *Notus*, *Dicranoneura*, *Dikraneura*, and *Parallaxis*, but is not considered to indicate close relationship between these genera.

In the remainder of the genera, veins IV and 2V are fused (except in *Hybla*), an occurrence which is unknown in any other Western Hemisphere Cicadellidae except in the closely related tribe Erythroneurini, which conceivably arose from dikraneurine stock. Coincident with the fusion of vannal veins, vein Cu_2 has migrated to a more basal position, resulting in a strengthening of the area of the hind wing weakened by the fusion of vannal veins. The fusion of vannal veins possibly arose twice in the Dikraneurini—once in the line of development leading to *Typhlocybella* (which appears closely related to *Parallaxis*), and again in the line leading to the *Dikrella* complex of genera (discussed below). Extreme reduction in hind wings with retention of both vannal veins is found only in the curious genus *Hybla*.

Further specialization of the wings, through reduction, occurs in the fusion of the apex of vein Cu_1 with vein M_{3+4} in *Idona*, *Typhlocybella*, and *Hybla*, genera which have too little else in common to validate this as a criterion of close relationship.

In each of the major groups mentioned above, those genera with two vannal veins and those with a single vannal vein, genera occur which lack a preapical lobe in the style. In the more generalized group (the retainers of both vannal veins), *Dicranoneura* and *Notus* exhibit this phenomenon. Whether the preapical lobe has been lost in these two genera, or whether it has never been present, is a matter for conjecture. Both of the genera possess curious additional morphological features. *Dicranoneura* has a membranous connective, a feature not found in other dikraneurine genera, but found in the more primitive Alebrini. *Dicranoneura* possesses, also, a thecate aedeagus. *Notus*, in addition to the unspecialized venation of the hind wings, has a paired ejaculatory duct, and a style broadly rounded apically suggesting a primitive condition antedating that of a mesal extension. However, the condition of both the style and the ejaculatory duct could be derived.

In the group of genera which have only a single vannal vein, *Sarascarta*, *Buritia*, and *Saranella* have styles which lack a preapical lobe. The reduced preapical lobe in *Neodikrella* (plate 24, fig. 64) suggests a possible loss of that structure in these genera, for the form of the styles and the connective in *Neodikrella* suggest an affinity with *Sarascarta* (plate 24, fig. 65).

The remainder of the genera form a complex already referred to as the "Dikrella complex." Included are *Dikrella*, *Alconeura*, *Donidea*, *Kidrella*, *Endoxoneura*, *Kunzeana*, *Dikrellidia* and *Idona*.

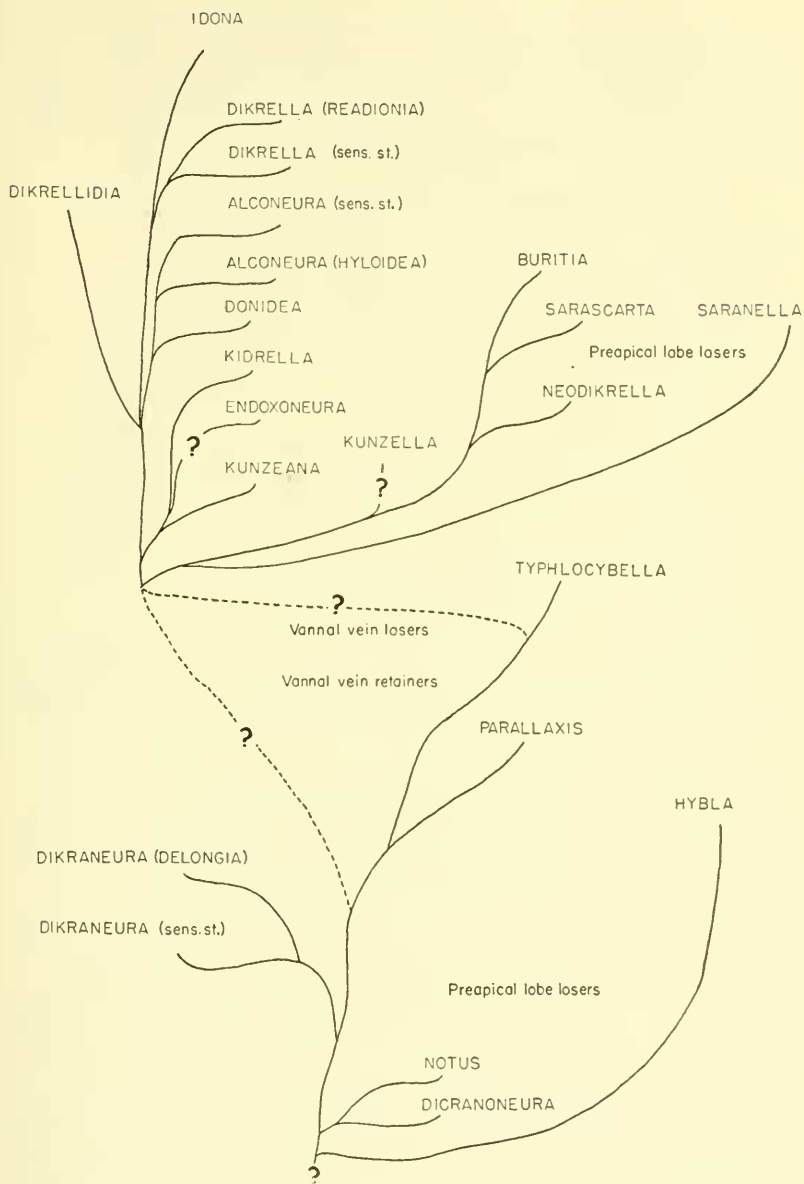


FIG. 1. Suggested relationships in Dikraneurini (the lines should be interpreted to have depth).

Hybla stands alone among the genera which retain both vannal veins, with a great reduction in venation of the hind wing, but with an unspecialized style.

- Connective Y-shaped or not, but with style apex always exceeding apex of connective; mesal apical extension of style less than one-third length of style from connective to hind margin of preapical lobe; fore wing with second apical cell broadened apically (fig. 49, 52) 9
9. Connective Y- or T-shaped; aedeagal apodeme of two conspicuous caliperate arms (plate 18, fig. 51)..... *Kidrella*
Connective broadly U-shaped; dorsal aedeagal apodeme a transverse vertical plate, or if with conspicuous arms, then arms parallel or divergent, not caliperate..... *Kunzeana*
10. Connective Y-shaped, the "stem" much longer than the "arms" and extending distad farther than the style apex; styles caliperate, without preapical lobes (plate 24, fig. 65d), *Sarascarta*
Connective Y-shaped or not, if Y-shaped, then "stem" subequal in length to "arms", rarely extending distad beyond style apex; styles not caliperate, with or without preapical lobes 11
11. Style apex with preapical lobe, with somewhat randomly arranged elongate fine setae extending from preapical lobe over apical extension uninterrupted, or on apical extension alone and wanting on preapical lobe (fig. 54h, 55d, 56g), *Alconeura*, 12
Style with or without preapical lobe; if present, then setae absent, or present and shorter and occurring in groups, not extending from posterior lobe over apical extension 13
12. Form not extremely depressed dorsoventrally..... subg. *Alconeura*
Form extremely depressed dorsoventrally..... subg. *Hyloidea*
13. Style elongate slender, without preapical lobe or apical extension, with conspicuous ventrolateral basal lamella (plate 25, fig. 67d); fore wing with third apical cell stalked..... *Saranella*
Style form varied, if elongate and slender, then without basal lamella; fore wing with third apical cell stalked or not..... 14
14. Fore wing with cells R and M extending distad to point nearly opposite apices of inner and outer apical cells; second and third apical cells with apical width equalling or exceeding length (plate 19, fig. 53b)..... *Donidea*
Fore wing with cells R and M not extending distad to point nearly opposite apices of inner and outer apical cells; apical width of second or third or both apical cells less than respective length, 15
15. Style sickle-shaped in lateral aspect, with few small setae near base of curved portion (plate 25, fig. 66d)..... *Buritia*
Style not sickle-shaped in lateral aspect, without setae near base, 16
16. Style short, very broad, with few long setae on apical extension; apex of connective exceeding style apex (plate 18, fig. 50d), *Endoxoneura*
Style apex greatly exceeding apex of connective..... 17
17. Style with conspicuous preapical lobe, not abruptly hooked at apex (plate 21, fig. 57g); pygofer hooks posterodorsal in origin or absent 18
Style without conspicuous preapical lobe, slender throughout, abruptly hooked at apex (plate 23, fig. 62d); pygofer hooks ventral in origin *Kunzella*

18. Anal hooks present; aedeagal shaft with dorsal process arising from base (plate 22, fig. 60e)..... *Dikrellidia*
 Anal hooks absent; aedeagal shaft without dorsal process arising from base *Dikrella*, 19
19. Genital capsule not dorsoventrally flattened; male plates contiguous in unmacerated specimens, not exposing aedeagus between their mesal margins at their bases subg. *Dikrella*
 Genital capsule dorsoventrally flattened; male plates not contiguous basally in unmacerated specimens, exposing aedeagus between their mesal margins at their bases (plate 22, fig. 58f),
 subg. *Readionia*
20. Hind wing with submarginal vein present at wing apex; third apical cell of fore wing not embracing entire wing apex.... 21
 Hind wing with submarginal vein absent at apex; third apical cell of fore wing embracing entire wing apex (plate 17, fig. 48a, b) *Typhlocybella*
21. Pygofer hooks usually present; apical extension of style with setae 22
 Pygofer hooks present or absent; apical extension of style without setae *Idona*
22. Pygofer hooks paired *Endoxoneura*
 Pygofer hooks single or absent..... *Alconeura* (*Hyloidea*)

Genus *Dicranoneura* Douglas

(Pl. 14, fig. 40; pl. 15, fig. 41)

Dicranoneura Douglas. Ent. Mo. Mag., vol. 12, p. 27. 1875.

Forcipata DeLong and Caldwell. Ann. Ent. Soc. Am., vol. 29 no. 1, p. 70. 1936 (type, *Forcipata loca* DeLong and Caldwell, by subsequent designation of DeLong and Caldwell in Ann. Ent. Soc. Am., vol. 35, p. 49. 1942), new synonymy.

Type of the genus, *Cicadula citrinella* Zetterstedt, by subsequent designation of Evans (Trans. Royal Ent. Soc. London, vol. 98 no. 6, p. 201. 1947).

Hind wings: vein IV and 2V separate apically; submarginal vein present, extending around wing apex; posterior branch of vein R fused with vein M_{1+2} apically; vein Cu_1 appearing branched apically; vein Cu_2 confluent with submarginal vein at point opposite vein m-cu.

Fore wings: inner apical cell elongate, nearly attaining apical wing margin; second and third apical cells elongate, slender, successively shorter.

Genital capsule: ninth male sternum quadrate, with internal median longitudinal ridge and marginal ridge; plates narrow, forcipate, exposing aedeagus between their mesal margins, each plate with longitudinal row of prominent setae; pygofer hooks wanting; pygofer without distinct group of setae just dorsad of outer basal angle of male plate, with microsetae of variable location interspecifically.

Internal male genitalia: style narrow, gradually tapered to rounded apex, without preapical lobe or apical extension; connective membranous, connected apically with ventral portion of aedeagal theca; aedeagus thecate (except in *magna*) on basal portion; genital atrium ventrally located.

The head, in dorsal aspect, is slightly produced medially, with the apex rounded. The pronotum is elongate, the lateral margins only slightly divergent posteriorly. The pleural portion of the pronotum is wider than the ocellocular area.

In unstained, cleared specimens, it is difficult to distinguish the delicate connective, and the aedeagus appears to be freely suspended in the genital capsule.

The name of this genus has long been considered to be an emendation of *Dikraneura*. That it may rightfully be considered to be so is open to grave doubt. The first use of the name did not clearly indicate that it was being used as an emendation, although it is quite clear from the original proposal that Douglas did consider it to be a partial synonym of *Dikraneura* Hardy and *Notus* Fieber. To the writer there seems as much reason to consider its first use as a separate proposal as to consider it as an emendation or as a substitute name. The names *Dikraneura* and *Dicranoneura* involve two separate Greek stems, and the fact that a "two-headed nerve" actually occurs in the hind wing of the species originally included (vein formed by preapical fusion of posterior branch of R with vein M_{1+2} , see figure 40a) suggests the idea that Douglas used the term by design, and not through an effort to emend *Dikraneura*.

The following species are included in this genus, from the New World. Only females of *acclina* were available for study.

Dicranoneura acclina (DeLong and Caldwell), 1936a: 74 (*Forcipata*), new combination

Dicranoneura ancantla (DeLong and Caldwell), 1936a: 73 (*Forcipata*), new combination

Dicranoneura lobata (Beamer), 1938d: 229 (*Forcipata*), new combination

Dicranoneura loca (DeLong and Caldwell), 1936a: 71 (*Forcipata*), new combination

Dicranoneura magna (DeLong and Caldwell), 1936a: 71 (*Forcipata*), new combination

Dicranoneura ohioensis (DeLong and Caldwell), 1936a: 73 (*Forcipata*), new combination

Dicranoneura ortha (DeLong and Caldwell), 1936a: 75 (*Forcipata*), new combination

Dicranoneura sricula (DeLong and Caldwell), 1936a: 72 (*Forcipata*), new combination

Dicranoneura triquetra (DeLong and Caldwell), 1936a: 72 (*Forcipata*), new combination

Genus *Notus* Fieber

(Pl. 15, fig. 42)

Notus Fieber. Verh. Zool. Bot. Ges. Wien, vol. 16, p. 507. 1866.*Dikraneura* (*Curta*) DeLong and Caldwell. Proc. Ent. Soc. Washington, vol. 39 no. 2, p. 30. 1937.

Type of the genus, *Cicada flavipennis* Zetterstedt, by subsequent designation of McAtee (Proc. Zool. Soc. London, 114. 1934).

Hind wings: vein IV branching from vein 2V near its midpoint; submarginal vein present, extending around wing apex, beyond apex of vein "R + M" then basad along costal margin; vein Cu₁ appearing branched apically; vein Cu₂ confluent with submarginal vein at point opposite vein m-cu.

Fore wings: inner apical cell elongate, nearly attaining wing apex; third apical cell frequently wider than outer apical cell; outer apical cell frequently open basally; inner apical vein variable, attaining wing margin in some specimens, represented by spur in others.

Genital capsule: male ninth sternum as long as or longer than broad; plates short, strongly curved mesad, overlapping apically, with oblique row of macrosetae and with subterminal spine; pygofer without distinct group of setae just dorsad of outer basal angle of male plate; pygofer hook wanting; female seventh sternum interrupted medially, exposing underlying membrane.

Internal male genitalia: style without preapical lobe or apical extension, its apex broadly rounded; connective U-shaped in broad aspect; preatrium long; shaft and gonoducts paired.

The species of this genus are similar in general appearance to *Dicranoneura* and *Dikraneura*. In dorsal aspect, the head is produced medially, with the apex rounded or angular. The head, including the eyes, is broader than the pronotum. The pronotum is elongate, its lateral margins scarcely divergent posteriorly. In lateral aspect, the line of the face is divergent from the contour of the dorsum. The width of the pleural portion of the pronotum is equal to or greater than the width of the ocellocular area.

The following species from the Western Hemisphere have been studied and are included here.

Notus alta (DeLong and Caldwell), 1937a: 31 (*Dikraneura* (*Curta*))

Notus sitka (DeLong and Caldwell), 1937a: 31 (*Dikraneura* (*Curta*))

Genus *Dikraneura* Hardy

Dikraneura Hardy. Trans. Tyneside Nat. Field Club, vol. 1, p. 423. 1850.

Chloroneura Walsh. Prairie Farmer, New Series, vol. 10, no. 10, p. 148. 1862.

(Type, *Chloroneura abnormis* Walsh, by subsequent designation of McAtee in Proc. Zool. Soc. London, p. 97. 1934).

Dicraneura (auctt.) (emendation of *Dikraneura* Hardy).

Dikraneura (*Notus*) Fieber of DeLong and Caldwell. Proc. Ent. Soc. Washington, vol. 39 no. 2, p. 22. 1937.

Type of the genus, *Dikraneura variata* Hardy, by monotypy.

Hind wings: vein 1V branching from vein 2V near its mid-length; submarginal vein extending around wing apex beyond apex of vein "R + M" then basad along costal margin; vein Cu₁ appearing branched apically; vein Cu₂ confluent with submarginal vein usually at point opposite vein m-cu.

Fore wings: first, second, and third apical cells much longer than broad, successively shorter towards radial margin; outer apical cell elongate, slender, nearly attaining wing apex.

Genital capsule: male plate, in ventral aspect, triangular, with oblique row of macrosetae extending to apex in some species, less extensive in others; pygofer with oblique row of setae along or parallel to posterodorsal margin, and with microsetae variously arranged; with or without pygofer hooks; anal hooks wanting.

Internal male genitalia: style short, with extremely broad pre-apical lobe which is frequently rolled dorsad, and with short mesal apical extension sharply rounded at apex; connective U- or Y-shaped; aedeagus with or without preatrium and with or without processes on shaft.

Erythria Fieber has been placed in synonymy with this genus by previous workers. It is not listed here as a synonym of *Dikraneura* because a study of the type of the genus, *Cicada aureola* Fallén, suggests the possibility that it and its European allies with short apical cells in the fore wing may represent a distinct segregate.

Liguropia menozzii Haupt, 1930, which is a synonym of *Dikraneura juniperi* Lethierry, 1876, and which is the type of *Liguropia* Haupt has not been studied by the writer, and hence this name is not placed in synonymy with *Dikraneura* Hardy at this time. Ribaut's (1936) figures of this species suggest that it might well be segregated from *Dikraneura*.

Dikraneura subgenus *Dikraneura* Hardy

(Pl. 15, fig. 43; pl. 16, fig. 44)

See references under generic heading for synonymy.

Type of the subgenus, *Dikraneura variata* Hardy, by monotypy.

Hind wings: as in generic description; vein Cu₂ is always confluent with submarginal vein at point opposite vein m-cu.

Fore wings: as in generic description; apical veins complete, not represented by spurs.

Genital capsule: male plate with oblique row of macrosetae ex-

tending nearly to apex, or less extensive; pygofer with hook arising from near middle of posterior margin and extending caudad or mesad, or if hook not distinctly produced, then posterior margin of pygofer thickened and heavily sclerotized, posterodorsal margin with group of small setae basad of pygofer hook, microsetae frequently present, arranged irregularly over disc.

Internal male genitalia: connective U-shaped in vertical plane at right angles to long axis of styles, each of the arms giving rise to a dorsally directed short process; aedeagus usually without preatrium, with shaft processes usually present; otherwise as in generic description.

The species included here are elongate and slender, and some shade of green or yellow, occasionally marked with red or rufous. The head is well produced and angulate. The median length of the pronotum greatly exceeds the median length of the head. In lateral aspect, the contour of the face is sharply divergent from the line of the dorsum. The pleural portion of the pronotum is usually narrow, not greatly exceeding in width the ocellocular area. Ocelli are absent.

The subgenus is Holarctic and Sonoran in distribution. The following species from the Western Hemisphere have been studied and are included here:

- Dikraneura abnormis (Walsh), 1864a: 316 (*Chloroneura*)
- Dikraneura absenta DeLong and Caldwell, 1937a: 28
- Dikraneura angustata Ball and DeLong, 1925a: 328
- Dikraneura arcta DeLong and Caldwell, 1937a: 29
- Dikraneura arizona DeLong and Caldwell, 1937a: 26
- Dikraneura carneola (Stål), 1858e: 196 (*Typhlocyba*)
- Dikraneura communis (Gillette), 1898a: 718 (*Dicraneura*)
- Dikraneura hungerfordi Lawson, 1930e: 39
- Dikraneura latacephala Beamer, 1943a: 57
- Dikraneura mali (Provancher), 1890a: 298 (*Erythroneura*)
- Dikraneura retusa Beamer, 1943a: 55
- Dikraneura robusta Lawson, 1930c: 41
- Dikraneura rufula (Gillette), 1898a: 720 (*Dicraneura*)
- Dikraneura serrata DeLong and Caldwell, 1937a: 24
- Dikraneura torta DeLong and Caldwell, 1937a: 25
- Dikraneura unguolata Beamer, 1943a: 55
- Dikraneura urbana Ball and DeLong, 1925a: 329

Dikraneura subgenus *Delongia*, nov.

(Pl. 16, fig. 45)

Type of the subgenus, *Dikraneura luna* DeLong and Caldwell.

Hind wings: venation as in typical subgenus, but vein Cu_2 is confluent with submarginal vein basad of vein m-cu.

Fore wings: apical portion of wing as in typical subgenus, but both inner and outer apical veins usually reduced to spurs of variable length, both frequently failing to attain wing margin.

Genital capsule: male plate much as in generic description, but without macrosetae over apical half; pygofer without hook or thickening on posterior margin, posterior margin truncate, with oblique row of submarginal macrosetae basad of posterodorsal margin, and few microsetae along posterior margin and in group on disc dorsad of outer basal angle of male plate.

Internal male genitalia: style as in typical subgenus; connective T-shaped in ventral aspect, the aedeagal articulation subterminal; preatrium distinct, the atrium occurring at end of basal third of length of aedeagus.

The head, including the eyes, is broader than the pronotum, greatly produced medially, and subangulate at apex. In lateral aspect, the crown is sharply rounded to the smoothly convex face. The pronotum is strongly convex anteriorly and has very short lateral margins. The pleural portion of the pronotum is narrower than the ocellocular area.

Only the type of the subgenus, a Sonoran species, is known.

D. (*Delongia*) *luna* DeLong and Caldwell, 1937a: 24

Genus *Parallaxis* McAtee

(Pl. 16, fig. 46; pl. 17, fig. 47)

Parallaxis McAtee, Journ. New York Ent. Soc., vol. 34, p. 154. 1926.

Erythria Fieber of Baker, in part, Invertebrata Pacifica, vol. 1, p. 3. 1903.

Type of the genus, *Parallaxis vacillans* McAtee, which is a synonym of *Erythria donaldsoni* Baker, by original designation.

Hind wings: vein IV present; vein 2V very poorly developed; submarginal vein present, extending around wing apex beyond apex of vein "R + M" thence basad along costal margin; vein Cu₁ appearing branched apically, both of the apparent branches attaining submarginal vein basad of wing apex; vein Cu₂ confluent with submarginal vein near midlength of wing, much basad of vein m-cu.

Fore wings: bases of first and second apical cells obliquely angulate, together forming an oblique jagged line from commisural margin to inner corner of third apical cell; third apical cell sessile, embracing wing apex; outer apical cell trapezoidal, not attaining wing apex; cells R and M broadened anteapically, occasionally with broadened portions cut off by adventitious cross veins to form anteapical cells, or partially cut off by vestigial adventitious cross veins.

Genital capsule: male plate, in ventral aspect with oblique single row of macrosetae over basal half of disc, in lateral aspect with number of small submarginal setae parallel to lateral margin over basal half, setae of apical half various; pygofer in lateral aspect with small group of microsetae just dorsad of outer basal angle of male plate, a small group of submarginal macrosetae basad of postero-dorsal margin, and occasionally smaller setae posterodorsad of these; pygofer hook present or absent, usually posterodorsal in origin when present, weak or strong, occasionally bifid.

Internal male genitalia: style with conspicuous preapical lobe and apical extension, the latter elongate and rounded apically, or short and obliquely truncate, the aedeagal articulation variable inter-specifically; aedeagus with preatrium well developed or short, dorsal apodeme well developed, aedeagal processes present at base or more distad on shaft.

The insects included here are usually predominantly dark in color, with a heavily sclerotized abdomen. The color of the dorsum is usually mottled green or yellowish, but may be gray or gray marked with brick red. The veins bordering the apical and preapical cells (when present) are conspicuously pale. The head, in dorsal aspect, varies from nearly parallel-margined to distinctly produced medially. The face, in profile, is smoothly convex. Ocelli are wanting. The pronotum has short lateral margins which are divergent posteriorly and a rectilinear posterior margin. The width of the pleural portion of the pronotum is subequal to the width of the ocellocular area.

The writer has examined the type series of *Erythria donaldsoni* Baker. The six specimens are in the Pomona College Collection, were collected by Baker, and are topotypic (Managua, Nicaragua). A female specimen from the series is here designated lectotype.

Six specimens of *Erythria guzmani* Baker, all topotypic, from the Pomona College Collection, are presumed to be the type series, but like the above, did not bear type labels. One of the series, a male (San Marcos, Nicaragua) is here designated lectotype.

The type of *Typhlocyba permunda* Stål was examined through the kindness of Dr. R. Malaise of the Riksmuseum of Natural History in Stockholm.

The genus is Neotropical in distribution.

Parallaxis donaldsoni (Baker), 1903c: 4 (*Erythria*), new combination

vacillans McAtee, 1926b: 154, new synonymy

Parallaxis guzmani (Baker), 1903c: 4 (*Erythria*), new combination

clathrata McAtee, 1926b: 157, new synonymy

- Parallaxis ornata* Osborn, 1928a: 266
Parallaxis permunda (Stål), 1862e: 56 (*Typhlocyba*)
Parallaxis respersa McAtee, 1926b: 156
Parallaxis tessellata McAtee, 1926b: 155

Genus *Typhlocybella* Baker

(Pl. 17, fig. 48)

Typhlocybella Baker. Invertebrata Pacifica, vol. 1, p. 3. 1903.

Type of the genus, *Typhlocybella minima* Baker, by monotypy.

Hind wings: vannal veins completely fused; submarginal vein absent at wing apex; posterior branch of R fused with vein M_{1+2} apically, the fusion vein not attaining the wing apex; apex of vein Cu_1 fused with apical portion of vein M_{3+4} so that vein Cu_1 appears unbranched apically; vein Cu_2 confluent with submarginal vein in basal half of wing.

Fore wings: third apical cell short, triangular, petiolate, embracing entire wing apex; bases of first and second apical cells together forming an irregular oblique line from commissural margin to base of petiole of third apical cell.

Genital capsule: plates finely pilose, with few basal macrosetae; pygofer with subterminal row of several macrosetae, and numerous irregularly arranged microsetae; apex of pygofer, in lateral view, occasionally with an emargination.

Internal male genitalia: style with single median elongate tapering apical extension, lacking hairs or setae; connective somewhat U-shaped with apex turned dorsad, the aedeagal articulation subterminal; preatrium short; aedeagal shaft flattened laterally, with pair of prominent processes separating from shaft subapically and extending dorsolaterally and single median dorsal apical process overhanging gonopore; dorsal aedeagal apodeme large.

The species are small with a subconically produced head. The head, including the eyes, is slightly wider than the pronotum. The pronotum is scarcely emarginate posteriorly. In profile, the line of the face is sharply divergent from the line of the dorsum. The margin between crown and face is rounded. Specimens are dull yellowish green, occasionally with darker markings.

The genus has a wide Neotropical distribution.

In addition to the species listed below, an undescribed species has been studied.

Typhlocybella minima Baker, 1903b: 3

Genus *Kunzeana* Oman

(Pl. 18, fig. 49)

Kunzeana Oman. Mem. Ent. Soc. Washington, no. 3, p. 83. 1949.

Type of the genus, *Dikraneura kunzei* Gillette, by original designation.

Hind wings: vannal veins completely fused; submarginal vein present, extending around wing apex beyond apex of vein "R + M" then basad along costal margin; veins Cu_1 and M_{3+4} separate apically (Cu_1 appearing branched apically); vein Cu_2 confluent with submarginal vein in basal half of wing, much basad of vein m-cu.

Fore wings: length of first, second, and third apical cells somewhat variable, their bases usually forming an irregular transverse line; *second apical cell distinctly narrower than either adjoining apical cell*; outer apical cell with length greatly exceeding width, apex not attaining wing apex; cells R and M with relative widths varying between species.

Genital capsule: male plate, in lateral aspect, broad, parallel-margined, with few macrosetae on disc near middle, usually in an oblique linear arrangement, with numerous microsetae irregularly arranged, usually with group of longer microsetae somewhere along lateral margin; pygofer with macrosetae lacking on disc, with few small setae on posterior lobe, and often with number of small microsetae arranged over disc; pygofer hook posterodorsal in origin, short, overhanging posterior pygofer lobe or situated internal to it, rarely with pygofer hook wanting.

Internal male genitalia: style, in dorsal aspect, with single median apical extension; in broad aspect with preapical lobe not sharply delimited, tapering to apical extension, provided with few setae on tapered portion; connective broadly U-shaped; *aedeagus with dorsal apodeme well developed, strongly sclerotized, occurring as a superior flattened plate, or as an H-shaped superstructure in anterior aspect, the dorsal arms always conspicuous*, atrial processes present or absent, simple or branched when present, shaft processes present or absent, occasionally branched when present; *preatrium wanting*.

The species included here are predominantly dull green in color, typically with the crown of the head, the narrow anterior portion of the pronotum, and the scutellum partly or entirely paler in contrast. In profile, the contour of the lower part of the face is usually subparallel to the line of the dorsum.

Two specimens of *Erythria deschoni* Baker, apparently the type series, although they did not bear type labels, were studied from the

Pomona College collection. One of the specimens had the abdomen missing, the other was a female. Both of the specimens lacked wings. The female specimen is here designated lectotype.

The genus is Sonoran and Neotropical in distribution. The species have been reported to feed upon Leguminosae. A number of undescribed species have been examined in addition to the species listed below:

- Kunzeana aurulenta* (Lawson), 1930e: 41 (*Dikraneura*), new combination
Kunzeana benedicti (Beamer), 1943a: 59 (*Dikraneura*)
Kunzeana curiosa (Beamer), 1943a: 83 (*Dikraneura*)
Kunzeana deschoni (Baker), 1903c: 5 (*Erythria*), new combination
Kunzeana furcata (Beamer), 1943a: 62 (*Dikraneura*)
Kunzeana kunzei (Gillette), 1898a: 721 (*Dicraneura*)
Kunzeana lenta (McAtee), 1926b: 160 (*Dikraneura*)
Kunzeana munda (Beamer), 1943a: 62 (*Dikraneura*)
Kunzeana myersi (McAtee), 1926b: 161 (*Dikraneura*)
Kunzeana rosea (Osborn), 1928a: 278 (*Dikraneura* (*Hyloidea*)), new combination
Kunzeana salicis (Beamer), 1943a: 63 (*Dikraneura*)
Kunzeana sandersi (Ball and DeL.), 1925a: 332 (*Dikraneura*)
Kunzeana tenera (Beamer), 1943a: 61 (*Dikraneura*)
Kunzeana texana (Beamer), 1943a: 61 (*Dikraneura*)

Of the species listed above, *sandersi* and *myersi* have not been seen by the author. Dr. Oman (1949) is followed, in placing these species in this genus.

Genus *Endoxoneura*, nov.

(Pl. 18, fig. 50)

Type of the genus, *Dikraneura* (*Hyloidea*) *splendidula* Osborn.

Hind wings: vannal veins fused; submarginal vein extending around wing apex; apical vein formed by fusion of posterior branch of R and M_{1+2} extending unbranched to submarginal vein near wing apex; vein Cu_1 confluent with submarginal vein at point proximad of bases of apical cells.¹

Fore wings: inner and outer apical cells angulate basally, their bases more proximad than bases of second and third apical cells; second and third apical cells equal in length, their bases forming a continuous transverse line.

Genital capsule: male plate with an oblique group of macrosetae and numerous scattered microsetae; pygofer hook posterodorsal in origin and surmounting a more inferior similar hook representing

1. The hind wings of the type were fragmentary, and it could not be determined whether the apex of Cu_1 was separate or fused with the apical portion of vein M_{3+4} .

the usual lobe found in this position, the more ventral hook with small group of microsetae; lateral face of pygofer lacking setae.

Internal male genitalia: style short, broad, with median apical conical posteriorly directed extension bearing two elongate setae on lateral face; preapical lobe small, situated near mid-length of that portion of style from connective to apex of broader portion; with few small setae within oblique posterior margin of preapical lobe; connective Y-shaped, its apex exceeding style apices, and turned dorsad, the aedeagal articulation subterminal; aedeagus with preatrium short, dorsal apodeme poorly developed; shaft with two pairs of processes given off near apex; gonopore terminal.

The head, including the eyes, is broader than the pronotum, and triangular in dorsal aspect, produced medially with the apex rounded. The pronotum, in dorsal aspect, is large with lateral margins nearly parallel and posterior margin very shallowly concave. The pleural portion of the pronotum is broader than the ocellocular area. In lateral aspect, the anterior margin of the head is thick. The contour of the face is subparallel to the line of the dorsum.

In structure of the fore wing, connective, styles (including setae), and general form of aedeagus (except apodemes) this genus is similar to *Kidrella*.

The type of the genus is Neotropical.

Endoxoneura splendidula (Osborn), 1928a: 275 [*Dikraneura* (*Hyloidea*)]

Genus *Kidrella*, nov.

(Pl. 18, fig. 51; pl. 19, fig. 52)

Type of the genus, *Dikraneura santana* Beamer.

Hind wings: vannal veins fused; submarginal vein present, extending around wing apex beyond apex of vein "R + M" then basad along costal margin; vein Cu₁ appearing branched apically, vein Cu₂ confluent with submarginal vein near middle of length of wing, much basad of vein m-cu.

Fore wings: inner apical cell much wider than either second or third apical cells; first and second apical cells scarcely wider at apex than at base; third apical cell much wider at apex than at base; first, second and third apical cells elongate slender, attaining apical wing margin; outer apical cell quadrilateral, not attaining wing apex; cells R and M subequal in apical width.

Genital capsule: male plate, in lateral aspect, exceeding tip of pygofer, with oblique row of few macrosetae over second fourth, and row of microsetae on disc distad of these to apex of plate, few

microsetae near lateral margin of plate near middle of its length; pygofer with posterodorsal margin produced, without a posterior margin; posteroventral margin with few microsetae near its middle; pygofer hook arising internally on posterodorsal portion of disc, extending posterodorsad.

Internal male genitalia: style elongate, slender, with distinct preapical lobe and mesal apical extension obliquely truncate at apex and provided with few setae along extension; connective Y-shaped; aedeagus without preatrium, slender, elongate, with paired processes arising from shaft near base or near apex; apodeme consisting of a pair of caliperate arms arising from atrium.

The line of the face, in lateral aspect, is only slightly divergent from the line of the dorsum. The width of the pleural portion of the pronotum is much greater than the width of the ocellocular area. The crown is shallowly depressed medially, or occasionally with a median slight carina and a consequent slight depression next each lateral margin.

This genus is known only from Arizona and Puerto Rico (an undescribed species).

Kidrella santana (Beamer), 1936a: 7 (*Dikraneura*), new combination

Genus *Donidca*, nov.

(Pl. 19, fig. 53)

Type of the genus, *Typhlocyba verticis* Baker.

Hind wings: vannal veins fused; submarginal vein present, extending around wing apex, beyond apex of vein "R + M" then basad along costal margin; vein Cu_1 appearing branched apically, not fused apically with apex of vein M_{3+4} ; vein Cu_1 confluent with submarginal vein at point much proximad of vein m-cu.

Fore wings: all apical cells subequal in length; apices of cells R and M much distad of bases of inner and outer apical cells; inner and outer apical cells quadrilateral; second apical cell trapezoidal; third apical cell greatly narrowed basally.

Genital capsule: male plate with oblique double row of macrosetae, with numerous dispersed microsetae; pygofer without macrosetae, with cluster of microsetae on posterior lobe; pygofer hook posterodorsal in origin, decurved, exceeding apex of pygofer, lying external to posterior pygofer lobe.

Internal male genitalia: style elongate, with small but distinct preapical lobe and median posteriorly directed extension bearing one or two setae; connective papilionaceous in outline, apex turned dorsad, the aedeagal articulation subterminal; preatrium short;

dorsal aedeagal apodeme laterally compressed, subquadrate, well developed; shaft with pair of short terminal posteriorly curved tapering processes, and pair of basally-arising tapering processes diverging caudolaterally from shaft, extending almost to tip.

The head is conically well produced, its median length approximately equal to that of the pronotum. The crown is convex, the lateral margins convex, in dorsal aspect, to the sharply rounded apex. The width of the head exceeds that of the pronotum. The lateral margins of the pronotum are short and subparallel, the posterior margin shallowly concave. In lateral aspect, the line of the face is almost parallel to the line of the dorsum. The pleural portion of the pronotum is broader than the ocellocular area.

A single specimen of the type species has been examined from the Pomona College collection, and compared with the type of *Dikraneura (Hyloidea) eburnea* Osborn.

The genus is known only from its type, a Neotropical species.

Donidea verticis (Baker), 1903d: 8 (*Typhlocyba*), new combination
eburnea (Osborn), 1928a: 276 [*Dikraneura (Hyloidea)*], new synonymy

Genus *Alconeura* Ball and DeLong

Alconeura Ball and DeLong. Ann. Ent. Soc. Am., vol. 18, p. 334. 1925.

Dikraneura (Hyloidea) McAtee. Journ. N. Y. Ent. Soc., vol. 34, p. 162. 1926,
new synonymy.

Dikraneuroidea Lawson. Bull. Brooklyn Ent. Soc., vol. 24, no. 5, p. 307. 1929,
new synonymy.

Type of the genus, *Alconeura rotundata* Ball and DeLong, by original designation.

Hind wings: vannal veins entirely fused; submarginal vein present, extending around wing apex, beyond apex of vein "R + M" then basad along costal margin; apical portion of Cu_1 free or fused with apical portion of vein M_{3+4} (vein Cu_1 appearing branched or unbranched); vein Cu_2 confluent with submarginal vein at point much basad of fusion of posterior branch of R with vein M_{1+2} .

Fore wings: outer apical cell short, its apex not attaining wing apex; third apical cell usually pedunculate, rarely triangular at base or sessile; inner apical cell broader than second apical cell.

Genital capsule: arrangement of setae on male plates greatly varied; pygofer without macrosetae on disc; pygofer hooks present or absent; anal hooks wanting.

Internal male genitalia: style with distinct preapical lobe and apical extension; style apex with numerous elongate fine setae not occurring in close-set groups or tufts; connective and aedeagus of varied form.

Alconeura subgenus *Alconeura* Ball and DeLong

(Pl. 20, fig. 54)

Alconeura Ball and DeLong. Ann. Ent. Soc. Am., vol. 18, p. 334. 1925.

Type of the subgenus, *Alconeura rotundata* Ball and DeLong, by original designation.

Hind wings: as in generic description.

Fore wings: inner apical cell broader than second apical cell; second apical cell slender, parallel-margined; third apical cell usually pedunculate, rarely triangular at base or sessile; outer apical cell short, broad, polygonal, not attaining wing apex.

Genital capsule: male plate, in lateral aspect, broad, parallel-margined to near broadly rounded apex, with single or double oblique row of macrosetae, with numerous microsetae; pygofer without distinct group of setae just dorsad of outer basal angle of male plate, with group of small setae along posterior margin; pygofer hooks present and prominent or reduced to heavily sclerotized rudiments, dorsal in origin or arising near middle of posterior margin.

Internal male genitalia: apical extension of style arising from dorsal face; style apex with numerous elongate fine setae somewhat randomly arranged; connective Y-shaped or modified but with Y-shaped thickening; aedeagus with preatrium very short or wanting, shaft usually laterally compressed, without processes or with processes from base of shaft or from ventral portion of atrial rim; aedeagal apodeme well developed.

This subgenus includes small delicate leafhoppers. The head, including the eyes, is narrower than the pronotum. The median length of the crown is usually equal to or greater than the distance between the eyes. The lateral margins of the pronotum are sharply divergent posteriorly. The pleural portion of the pronotum is broader than the ocellocular area. There is nearly always a dark spot in the third or fourth apical cell of the fore wing. The species are variable as to color markings, but a considerable group are pale, marked with orange, and with apical veins edged in black.

Most of the species are Neotropical and Sonoran.

The wings of the type of *Dikraneura (Hyloidea) flavida* Osborn are so badly damaged that wing characters cannot be verified.

Alconeura balli Beamer, 1934b: 17

Alconeura bisagittata (Beamer), 1943a: 63 (*Dikraneura*), new combination

Alconeura centrosenae (Oman), 1937d: 568 (*Dikraneura*), new combination

Alconeura cornigera Griffith, 1938a: 332

- Alconeura* *directa* Griffith, 1938a: 325
Alconeura *dodonana* Beamer, 1934b: 17
Alconeura *dorsalis* (DeLong), 1924a: 67
Alconeura *flavida* (Osborn), 1928a: 277 (*Dikraneura* (*Hyloidea*)), new combination
Alconeura *fulminea* Lawson, 1930d: 44
Alconeura *insulae* Griffith, 1938a: 325
Alconeura *languida* Griffith, 1938a: 330
Alconeura *lappa* Griffith, 1938a: 327
Alconeura *luculenta* Griffith, 1938a: 331
Alconeura *macra* Griffith, 1938a: 327
Alconeura *necopinata* Griffith, 1938a: 318
Alconeura *nudata* Ball and DeLong, 1925a: 336
Alconeura *obliquata* (Osborn), 1928a: 270 (*Dikraneura*), new combination
Alconeura *planata* Ball and DeLong, 1925a: 337
Alconeura *pseudo-maculata* (Baker), 1903d: 8 (*Typhlocyba*), new combination
Alconeura *pseudo-obliqua* (Baker), 1903d: 9 (*Typhlocyba*), new combination
Alconeura *quadrifasciata* Lawson, 1930d: 45
Alconeura *quadrivittata* (Gillette), 1898a: 723 (*Dicraneura*)
Alconeura *rotundata* Ball and DeLong, 1925a: 335
Alconeura *santaritana*, new name for *beameri* Griffith, 1936 nec Lawson, 1929
Alconeura *tricolor* (Van Duzee), 1914a: 56 (*Dicraneura*)
Alconeura *unipuncta* (Gillette), 1898a: 718 (*Dicraneura*)

Alconeura subgenus *Hyloidea* McAtee

(Pl. 20, fig. 55; pl. 21, fig. 56)

Dikraneura (*Hyloidea*) McAtee. Journ. New York Ent. Soc. vol. 34, p. 162. 1926.

Dikraneuroidea Lawson. Bull. Brooklyn Ent. Soc., vol. 24, no. 5, p. 307. 1929.

Type of the subgenus, *Dikraneura* (*Hyloidea*) *depressa* McAtee, by original designation.

Hind wings: as in generic description.

Fore wings: inner apical cell angulate basally, broader than second apical cell, not attaining wing apex; third apical cell pedunculate; outer apical cell in form of trapezium or subtrapezoidal, its apex not attaining wing apex.

Genital capsule: male plate, in lateral aspect, elongate, greatly exceeding apex of pygofer, with discal macrosetae usually greatly reduced in size, other setae various, frequently with cluster or row of close-set setae along lateral margin, apex usually truncate or even notched; pygofer, in lateral aspect, slender, elongate, without discal macrosetae, posterodorsal margin usually giving rise to short acicular pygofer hook overhanging posterior lobe of pygofer which bears few posteriorly directed microsetae.

Internal male genitalia: style with mesal apical extension, long or short, rounded at apex and bearing setae which are usually

numerous and elongate, exceeding style apex, occurring both mesally and laterally on style when few in number; connective triangular to T-shaped with apex turned dorsad and aedeagal articulation subterminal; aedeagus varied, shaft usually laterally compressed.

The species are greatly flattened dorsoventrally. In profile, the line of the face is nearly parallel to the line of the dorsum. The crown of the head is ample, and well-produced medially. The pleural portion of the pronotum is broad, its width more than double that of the ocellocular area.

In addition to the named species, undescribed species have been examined from Mexico, Costa Rica, Cuba, and Peru.

Alconeura beameri (Lawson), 1929d: 307 (*Dikrancuroidea*), new combination

Alconeura depressa (McAtee), 1926b: 162 (*Dikrancura* (*Ilyloidea*)), new combination

Alconeura montealegrei (Baker), 1903c: 4 (*Erythria*), new combination

The type series of *Erythria montealegrei* Baker has been examined. It consists of a male and a female specimen from Champerico, Guatemala, and a specimen with the abdomen missing from Managua, Nicaragua. The male, from Champerico, Guatemala is here designed lectotype. The specimens are in the Pomona College Collection.

Genus *Dikrella* Oman

Dikrella Oman. Mem. Ent. Soc. Washington, no. 3, p. 83, 1949.

Type of the genus, *Dicraneura cockerellii* Gillette, by original designation.

Hind wings: vannal veins fused; submarginal vein extending around wing apex, beyond apex of vein "R + M" then basad along costal margin; vein Cu_1 appearing branched apically (its apex not fused with apex of vein M_{3+4}); vein Cu_2 confluent with submarginal vein in basal half of wing, much basad of apparent forking of vein Cu_1 .

Fore wings: first, second, and third apical cells successively shorter; inner apical cell nearly attaining wing apex, broader at base than at apex; second and third apical cells broader at apex than at base, the third rarely stalked; outer apical cell triangular or quadrilateral.

Genital capsule: male plate varied in form, with few macrosetae in an oblique linear arrangement over disc in macerated specimens; pygofer without macrosetae, with few small setae located postero-

dorsally along margin or submarginal; *pygofer hook dorsal* (along mesal pygofer margin) in origin, or wanting, extending caudad, mesad, or caudoventrad when present; anal hooks absent.

Internal male genitalia: style short, with well-developed preapical lobe and mesal apical extension, *with few fine setae on posterior margin of preapical lobe, and rarely with group of similar setae located on apical extension*; connective triangular, papilionaceous, V-shaped or Y-shaped in form; aedeagus quite variable in form, preatrium usually present, ventral processes paired or unpaired usually present, arising from preatrium, atrium, or shaft.

Dikrella subgenus *Dikrella* Oman

(Pl. 21, fig. 57)

See reference under generic heading.

Type of the subgenus, *Dicraneura cockerellii* Gillette, by original designation.

Wings: as in generic description.

Genital capsule: capsule not conspicuously flattened dorsoventrally; male plates, in ventral aspect, with mesal margins contiguous basally in unmacerated specimens, not exposing aedeagus between them, plates without a lateral scale-like extension from lateral margin in ventral aspect, in macerated specimens; pygofer without posterodorsally directed lobe, with small setae on posterodorsal portion of disc or along posterior margin; pygofer hooks present or absent, when present arising from mesal (dorsal) pygofer margin and extending caudad, mesocaudad, or caudoventrad within capsule wall, in form slender and acicular, rarely ramose.

Internal male genitalia: style with conspicuous preapical lobe and mesal apical extension, preapical broad portion frequently somewhat rolled along both margins, presenting a troughlike appearance in caudal aspect, and with few fine hairlike setae arising from apex of lateral rolled edge, or when style is flatter and not troughlike, from a bulla at lateral angle of preapical lobe, occasionally (*cockerellii* and an undescribed species) with few hairs in a group on apical extension, but never with continuous array of elongate hairs over preapical lobe and apical extension as in *Alconeura*; connective typically papilionaceous in outline, but occasionally modified to V- or T-shaped; aedeagus quite varied, with preatrium nearly always present (absent in two undescribed species), with ventral processes usually present and arising from preatrium, atrium or shaft.

The species are extremely small and delicate in form, and pale in color, occasionally marked with red. The apical cells of the fore wings frequently have clouded portions, but the distinct dark spot so characteristic of *Alconeura* is usually absent. The head is well produced medially, with the apex rounded. Its width, including the eyes, is nearly always less than the width of the pronotum. The pleural portion of the pronotum is usually conspicuously broader than the ocellocular area. In lateral aspect, the contour of the face is divergent from the line of the dorsum.

The subgenus is interesting from the standpoint that good specific characters occur in the form of the style apices, and in the form of the connective, as well as the aedeagus. In addition to the species listed below, thirteen undescribed species have been studied.

The subgenus is predominantly Neotropical and Sonoran in distribution, with a few Nearctic representatives.

Dikrella aegra (Beamer), 1936c: 55 (*Dikraneura*)

Dikrella affinis (Osborn), 1928a: 269 (*Dikraneura*), new combination

Dikrella albonasa (McAtee), 1926b: 160 (*Dikraneura*), new combination

Dikrella californica (Lawson), 1930e: 35 (*Dikraneura*)

var. *imbellis* (Lawson), 1930e: 37 (*Dikraneura*)

nevadensis (Lawson), 1930e: 38 (*Dikraneura*), new synonymy

Dikrella cockerellii (Gillette), 1895a: 14 (*Dicraneura*)

Dikrella cruentata (Gillette), 1898a: 717 (*Dicraneura*)

Dikrella debilis (McAtee), 1926b: 162 (*Dikraneura*)

Dikrella fumida (Osborn), 1928a: 276 (*Dikraneura* (*Hyloidea*)), new combination

Dikrella hamar (DeL. and Ross), 1950a: 87 (*Dikraneura*), new combination

Dikrella maculata (Gillette), 1898a: 716 (*Dicraneura*)

Dikrella mera (McAtee), 1924a: 76 (*Dikraneura*)

Dikrella pusilla (Lawson), 1930e: 37 (*Dikraneura*)

Of the above, no males were available for study in the cases of *mera* and the typical variety of *californica*. *Fumida* Osborn is placed here because of the great similarity in male genitalia to other species in this subgenus. The type had the wings so badly damaged that the venation could not be discerned.

Dikrella subgenus *Readionia*, nov.

(Pl. 22, fig. 58)

Type of the subgenus, *Dikraneura readionis* Lawson.

Wings: as in generic description.

Genital capsule: capsule compressed dorsoventrally; male plates, in unmacerated specimens, in ventral aspect, with mesal margins not contiguous at base, the aedeagus visible between their bases, approximate apically; in macerated specimens plate with lateral

scalelike excrescence and with two conspicuous macrosetae on disc near lateral margin; pygofer with lobe arising posterodorsally and directed dorsocaudad, with few microsetae on lobe and occasionally on disc of pygofer, pygofer hook arising along dorsal (mesal) margin, extending caudad or mesocaudad, within lateral pygofer wall.

Internal male genitalia: style rolled and trough-like preapically as in typical subgenus, with few elongate fine setae at apex of lateral rolled portion, and occasionally one or two along posterior margin of preapical lobe; mesal apical extension of style slender and usually truncate apically, lacking setae; connective papilionaceous; aedeagus with preatrium well developed and with single or paired ventral aedeagal processes arising from atrium or shaft.

The species of this subgenus are very similar in appearance to those of the typical subgenus, but are usually larger, and with much longer wings. The lower part of the face, in lateral aspect, is frequently parallel to the line of the dorsum.

The distribution is Neotropical and Sonoran.

This subgenus is dedicated to the late Professor Philip A. Readio, who unselfishly devoted much time to the earlier training of the writer, and whose enthusiasm and stimulating interest have ever been a pleasing memory.

Dikrella cedrelae (Oman), 1937d: 569 (*Dikraneura*), new combination

Dikrella readionis (Lawson), 1930e: 39 (*Dikraneura*), new combination

In addition to the species listed above, a number of undescribed species have been studied.

Genus *Idona* DeLong

(Pl. 22, fig. 59)

Empoasca (*Idona*) DeLong. U. S. Dept. Agr. Tech. Bull., no. 231, p. 50. 1931.

Type of the genus, *Empoasca minuenda* Ball, by original designation.

Hind wings: vannal veins fused; submarginal vein extending around wing apex beyond apex of vein "R + M" then basad along costal margin; vein Cu_1 appearing unbranched apically (its apical portion fused with apical portion of vein M_{3+4}); vein Cu_2 confluent with submarginal vein in basal portion of wing, much basad of fusion of posterior branch of vein R with vein M_{1+2} .

Fore wings: inner apical cell larger than other apical cells, scarcely attaining wing apex; second apical cell slender, sessile; third apical cell quadrangular or triangular, frequently petiolate;

outer apical cell short, trapezoidal, not attaining wing apex; first, second and third apical cells successively shorter.

Genital capsule: male plate, in ventral view, with sclerotized internal thickening along lateral margin, extending distad for a variable distance forming "shoulder" in lateral margin of a plate at apex of thickened portion (occasionally before its apex), the shoulder bearing one or more stout setae (macerated specimens), the basal portion of the lateral sclerotized thickening connected by a basal transverse internal ridge with style opposite articulation with connective; plate without macrosetae in linear series; pygofer usually with group of small setae located posterodorsally; pygofer hooks present or absent, posterior or posterodorsal in origin when present, usually simple but occasionally modified (bifid at apex or hairy in appearance).

Internal male genitalia: style with distinct preapical lobe and apical extension from mesal margin, directed posteriorly; style usually troughlike in caudal aspect as in *Dikrella*; posterior lobe with few fine setae, usually short, rarely long and extending to apex of apical extension of style; connective very variable interspecifically, Y-, U-, or V-shaped, or in the form of a cross bar, the aedeagal articulation subterminal; aedeagus with distinct preatrium; aedeagal shaft laterally compressed; with pair of aedeagal processes arising from preatrium, lower portion of atrial rim, or base of shaft.

The species included here are very small, delicate leafhoppers with diverse color patterns or without color patterns. The head is subconically produced with rounded apex, in dorsal aspect. The contour of the face is quite divergent from the line of the dorsum. The posterior margin of the pronotum tends to be subparallel to the anterior margin, leaving the scutellum broadly exposed.

The holotype of *Dikraneura* (*Hylloidea*) *hyalina* Osborn has been studied. It has hind wings with a venation corresponding to that described above. The fore wings are somewhat similar to other species in this genus, except that the third apical cell is not narrowed basally. The fore wings are subfalcate apically. It seems best to include this species here, provisionally, until males can be obtained for study. Unfortunately, its inclusion here forces the renaming of *hyalina* (Beamer), which is a secondary homonym.

The genus is represented by a number of species in addition to the described species listed below. In distribution it is Neotropical and Sonoran.

- Idona aperta* (Beamer), 1943a: 58 (*Dikraneura*), new combination
Idona beameri, new name for *hyalina* (Beamer), 1943a: 58 *nec* Osborn, 1928
Idona hyalina (Osborn), 1928a: 276 (*Dikraneura (Hyloidea)*), new combination
Idona minuenda (Ball), 1921a: 23 (*Empoasca*)
Idona rubens (Beamer), 1934b: 16 (*Dikraneura*), new combination
Idona sexmaculata (DeLong), in Wolcott, 1923b: 270

Genus *Dikrellidia*, nov.

(Pl. 2, fig. 8; pl. 22, fig. 60; pl. 23, fig. 61)

Type of the genus, *Dikraneura bilineata* Osborn.

Hind wings: vannal veins fused; submarginal vein present, extending around wing apex beyond apex of vein "R + M" then basad along costal margin; vein Cu₁ appearing branched apically (its apical portion not fused with apical portion of vein M₃₊₄); vein Cu₂ confluent with submarginal vein in basal half of wing, much basad of vein m-cu.

Fore wings: inner and outer apical cells trapezoidal, the greatest width of each equal to or exceeding combined width of second and third apical cells at their bases; second apical cell longer than third; preapical width of cell R exceeding adjacent width of cell M.

Genital capsule: male plate with oblique row of macrosetae and dispersed apical microsetae; pygofer surface lacking conspicuous setae; a pair of inverted U-shaped hooks arising as introversions, one on each side, from posterior face of basal portion of anal tube, their lumen broadest posteriorly and readily seen in caudal in view.

Internal male genitalia: style elongate, slender, with conspicuous preapical lobe and mesal elongate posteriorly-directed cylindrical extension obliquely truncate apically; connective very shallowly U-shaped, the apex turned dorsad, the aedeagal articulation subterminal; aedeagus with bulbous basal portion giving off pair of ventrolateral elongate terete sinuate processes; atrial rim thickly sclerotized and giving off single dorsal posteriorly-directed conical cuspidate apodeme which is curved distally.

The head is well produced medially, the apex of the crown angular in dorsal aspect. The median length of the crown greatly exceeds the width between the eyes. The width of the head, including the eyes, exceeds the width of the pronotum. The pronotum is short, with lateral margins distinctly divergent posteriorly and the posterior margin shallowly emarginate. In lateral aspect, the face is smoothly and slightly convex, and divergent from the line of the dorsum. The pleural portion of the pronotum is much broader than the ocellocular area.

Only the type of the genus, a Bolivian species, is known.

Dikrellidia bilineata (Osborn), 1928a: 270 (*Dikraneura*), new combination

Genus *Kunzella*, nov.

(Pl. 23, fig. 62)

Type of the genus, *Dikraneura marginella* Baker.

Hind wings: vannal veins fused; submarginal vein present, extending around wing apex, beyond apex of vein "R + M" then basad along costal margin; vein Cu_1 appearing branched apically (its apical portion not fused with apical portion of vein M_{3+4}); vein Cu_2 confluent with submarginal vein in basal half of wing, much basad of vein m-cu.

Fore wings: apical venation quite variable between species; inner apical cell rectilinear or angulate basally; bases of second, third, and fourth apical cells often forming a slightly oblique line; outer apical cell elongate and slender or short and nearly semicircular, not attaining wing apex.

Genital capsule: male plate with oblique group of macrosetae near base and numerous dispersed microsetae; pygofer without distinct macrosetae; *pygofer hook arising from internal part of lower pygofer wall, extending posterodorsad.*

Internal male genitalia: style without preapical lobe, but with apical extension strongly arched in broad aspect and without setae; connective narrow, subtrapezoidal; genital atrium near base of aedeagus, the preatrium short; shaft massive, laterally compressed, with several subterminal processes.

The species are similar in appearance to species of *Kunzeana*—dull green, but with contrastingly paler crown, narrow anterior margin of pronotum, and entire scutellum. The head is well produced medially, the apex subangulate in dorsal aspect. The head, including the eyes, is somewhat narrower than the pronotum. In lateral aspect, the contour of the face is slightly convex, and divergent from the line of the dorsum. The pleural portion of the pronotum is broader than the ocellocular area. The apical cells of the fore wing are subhyaline.

The distribution is Neotropical. One undescribed species has been studied.

Kunzella marginella (Baker), 1925a: 160 (*Dikraneura*), new combination

Kunzella russea (McAtee), 1926b: 160 *Dikraneura*, new combination

Genus *Neodikrella*, nov.

(Pl. 23, fig. 63; pl. 24, fig. 64)

Type of the genus, *Dikraneura (Hylloidea) disconotata* Osborn.

Hind wings: vannal veins fused; submarginal vein extending around wing apex beyond apex of vein "R + M" then basad along costal margin; vein Cu_1 appearing branched apically (its apical portion not fused with apical portion of vein M_{3+4}); vein Cu_2 confluent with submarginal vein in basal half of wing, much basad of vein m-cu.

Fore wings: wing apex falcate; greatest width of inner apical cell exceeding combined width of second and third apical cells; second apical cell narrowed distally.

Genital capsule: male plate with oblique row of macrosetae and numerous scattered microsetae, some short, some elongate and fine; surface of pygofer without macrosetae pygofer hook elongate, dorsal in origin, extending caudad, overhanging and exceeding narrow posterodorsal caudally directed pygofer lobe.

Internal male genitalia: style with elongate tapering apical extension directed caudad but curved slightly mediad posteriorly; length of apical extension subequal to that segment of style from connective to apical extension; preapical lobe with minute setae; connective Y-shaped, the stem elongate, extending more caudad than style apices, with preapical bulbous enlargement; aedeagus complex, a horseshoe-shaped accessory piece surrounding genital atrium at sides and beneath, the side portions greatly expanded, the ventral portion with an anteriorly directed lobe articulating with connective, a pair of elongate tapering dorsally curved processes arising from lateral expanded portions of accessory piece, and a second similar pair of processes arising ventrally from basal articular portion and extending parallel to above pair of processes; aedeagal shaft unornamented.

The head is considerably produced before the eyes. In lateral view, the margin between crown and face is not carinate, and the line of the face is subparallel to the line of the dorsum. The pleural portion of the pronotum is broader than the ocellocular area.

Neodikrella disconotata (Osborn), 1928a: 275 (*Dikraneura (Hylloidea)*), new combination

Genus *Sarascarta*, nov.

(Pl. 24, fig. 65)

Type of the genus, *Dikraneura (Hylloidea) fulva* Osborn.

Hind wings: vannal veins fused; submarginal vein extending

around wing apex, beyond apex of vein "R + M" then basad along costal margin; vein Cu_1 appearing branched apically (its apex not fused with apical portion of vein M_{3+4}); vein Cu_1 confluent with submarginal vein in basal half of wing, much basad of vein m-cu.

Fore wings: first three apical cells progressively shorter and narrower; base of inner apical cell angular; outer apical cell open at base.

Genital capsule: male plate with oblique basal group of macrosetae; pygofer without macrosetae, with microsetae on disc; pygofer hook massive, arising posterodorsally with dorsal lightly sclerotized supporting arm.

Internal male genitalia: *styles caliperate apically*, sinuately curved laterad basally, then mesad distally, *without apical extension or pre-apical lobe*, with few subapical setae located on outer margins; connective T-shaped, widened apically, with elongate stem, *apex exceeding style apices*; aedeagus laterally compressed, preatrium wanting; paired ventral atrial processes present or absent.

The head is slightly deflexed. In profile, the line of the face is subparallel to the line of the dorsum. The pleural portion of the pronotum is subequal in width to the ocellocular area. The pronotum is broadly emarginate posteriorly, leaving the scutellum broadly exposed.

The fore wings of both available specimens of the genotype were coriaceous to the degree that the venation could not be ascertained. The venation figured is that of a single undescribed Bolivian specimen from the U. S. National Museum collection.

In addition to the Bolivian specimen mentioned above, a second undescribed species from Argentina has been examined, and a third from Puerto Rico.

Sarascarta fulva (Osborn), 1928a: 277 (*Dikraneura* (*Hylodea*)), new combination

Genus *Buritia*, nov.

(Pl. 25, fig. 66)

Type of the genus, *Dikraneura lepida* McAtee.

Hind wings: vannal veins fused; submarginal vein extending around wing apex beyond apex of vein "R + M" then basad along costal margin; vein Cu_1 appearing branched apically (its apical portion not fused with apical portion of vein M_{3+4}); vein Cu_2 confluent with submarginal vein much basad of vein m-cu.

Fore wings: inner apical cell quadrilateral, its apex not attaining wing apex; second apical cell angular at base, almost parallel margined, slightly longer at apex than at base; third apical cell triangu-

lar, embracing most of wing apex; outer apical cell nearly triangular, its apex not attaining wing apex.

Genital capsule: male plate, in ventral aspect, broad at base, gradually narrowed on outer margin over apical three-fourths to sharply rounded apex, with row of macrosetae along lateral margin over basal two-thirds; in lateral aspect, plate conspicuously flat, with apex turned sharply dorsad; pygofer, in lateral aspect short, with elongate parallel-margined projection from middle of posterior margin and more heavily sclerotized hook immediately ventrad of this, disc without macrosetae, with few irregularly arranged microsetae.

Internal male genitalia: style elongate, slender, gradually tapered to acute apex, without preapical lobe or apical extension, in lateral aspect with apical portion sickle-shaped, curved sharply dorsad near articulation with connective, then gradually ventrad towards apex, with few small setae on ventral margin near beginning of curved portion; connective broadly U-shaped with pair of dorsal preapical projections, the aedeagal articulation subterminal; aedeagus without processes, with well-developed preatrium, shaft dorsoventrally (anteroposteriorly) compressed; dorsal apodeme well developed, branched, each branch with an anterior and a posterior process.

The head is well produced, the median length of the crown slightly less than the distance between the eyes. The width of the head, including the eyes, is slightly greater than the width of the pronotum. The pronotum is much longer than the head, with lateral margins nearly parallel and posterior margin nearly straight. In lateral aspect, the surface of the crown and the pronotum form a continuous declivent surface. The anterior margin of the head is thick, and the line of the face flat, not greatly divergent from the line of the dorsum. The pleural portion of the pronotum is subequal in width to the ocellular area.

The genus is named for the settlement of Buriti, in Matto Grosso, Brazil, which is near the collecting site of many of the known South American leafhoppers which bear the locality label, "Chapada, Brazil," according to Dr. John Lane, of the University of São Paulo. *Buritia lepida* (McAtee), 1926b: 161 (*Dikraneura*), new combination

Genus *Saranella*, nov.

(Pl. 25, fig. 67; pl. 26, fig. 68)

Type of the genus, *Dikraneura* (*Hyloidea*) *miconotata* Osborn.

Hind wings: vannal veins fused; submarginal vein extending around wing apex, beyond apex of vein "R + M" then basad along

costal margin; vein Cu_1 appearing branched apically (its apical portion not fused with apical portion of vein M_{3+4}); vein Cu_2 confluent with submarginal vein in proximal half of wing, much basad of vein m-cu.

Fore wings: greatest width of inner apical cell subequal to combined widths of second and third apical cells; inner and outer apical cells broad basally; second apical cell with lateral margins sinuate and subparallel; third apical cell pedunculate; pattern formed by bases of apical cells transverse, bowed caudad at caudal margins of cells R and M.

Genital capsule: plate with prominent lobe on outer margin before apex and with lateral oblique row of macrosetae; pygofer lacking setae except near origin of pygofer hook; pygofer hook arising internally on posterodorsal lobe, in dorsal aspect the two hooks elongate, slender, crossed.

Internal male genitalia: style elongate, slender, parallel-margined with slightly decurved acute tip, *lacking apical extension but with posterolaterally directed flat basal truncate extension arising opposite articulation with connective and connected with outer basal angle of male plate*; style without macrosetae; connective Y-shaped with apex turned dorsad, the aedeagal articulation subterminal; aedeagus simple, without processes; preatrium short.

The crown of the head and the disc of the pronotum form a smoothly convex surface. The face, in profile, is flattened, its contour nearly parallel to that of the dorsum. The pronotum is scarcely emarginate behind. The pleural portion of the pronotum is narrower than the ocellocular area.

Saranella micronotata (Osborn), 1928a: 278 (*Dikraneura* (*Hyloidea*)), new combination

Genus *Hybla* McAtee

(Pl. 26, fig. 69)

Hybla McAtee. Journ. Dept. Agr. Puerto Rico, vol. 16 no. 2, p. 119. 1932.

Type of the genus, *Hybla maculata* McAtee, by original designation.

Hind wings: vein 1V branching from vein 2V basad of its midpoint; submarginal vein extending around wing apex beyond apex of vein "R + M" then basad along costal margin; apical portion of vein Cu_1 free, not connected at all with any portion of vein M_{3+4} which does not occur as a separate vein; vein Cu_2 confluent with submarginal vein in basal half of wing.

Fore wings: first, second, and third apical cells successively

shorter, slender, narrow, each narrower than outer apical cell; outer apical cell open at base, its apex almost attaining wing apex.

Genital capsule: male plate, in ventral aspect, slender, gradually tapering from base to sharply rounded apex; in lateral aspect exceeding apex of pygofer; with oblique row of macrosetae over basal half of plate near lateral margin and marginal row of smaller setae on lateral margin near base; pygofer slender, posterodorsal margin extended caudad in digitate process which is not differentially sclerotized; disc of pygofer with few small microsetae.

Internal male genitalia: style, in dorsal aspect, elongate, slender, gradually curved posterolaterad in apical half to extreme apex which is abruptly curved laterad, inner margin with slight preapical prominence, terminal margin obliquely truncate; connective Y-shaped, the apex turned dorsad, the aedeagal articulation subterminal, anterior portion with median ventral attachment to venter of ninth segment; aedeagus slender, elongate, with recurved slender apical process bifid at tip and pair of retrorse processes arising near preapical gonopore on posterior (ventral) margin; preatrium wanting; apodeme slender, distinct.

The leafhoppers have a well-produced head, with the median length of the crown subequal to the width between the eyes, in the males, and to the median length of the pronotum. In dorsal aspect, the anterior margin of the crown is bluntly angulate. The head, including the eyes, is broader than the pronotum. The pronotum is broader than long. In lateral aspect, the contour of the face is subparallel to the line of the dorsum. The pleural portion of the pronotum is much broader than the ocellocular area.

The genus is known only from the type of the genus, a Puerto Rican species.

Hybla maculata McAtee, 1932b: 119.

TRIBE ERYTHRONEURINI, nov.

In the tribe Erythroneurini are placed all those Typhlocybinae in which the vannal veins are fused, Cu_1 appears branched apically (its apical portion not fused with the apical portion of vein M_{3+4}), Cu_2 is confluent with the submarginal vein in the basal half of the wing, and in which the style apices are in one of two forms of development: first, a single flattened apical extension which is truncate apically (Pl. 3, fig. 9), and second a condition in which a second extension has developed from the outer apex of the first extension (Pl. 3, figs. 10-15). In the second condition, the mesal apex of the first extension is represented by the "heel".

In the present classification, all those leafhoppers with a single broad extension of the style apex are placed in the genus *Zygina*. This genus is a complex of considerable size and wide distribution and is doubtless destined to undergo considerable subdivision.

In the Western Hemisphere, species of *Zygina*, hitherto referred to as the "Western *obliqua* group" of the genus *Erythroneura*, are known to occur from northern California and Colorado to Central America. The writer has examined specimens of an undescribed species from Argentina. Matsumura has described species from the Orient, and while not too much weight can be attached to the generic placement, his figures for the wings (1931b) suggest an accurate placement. *Erythroneura zealandica* Myers from New Zealand has been examined and found to belong to the *Zygina* complex as defined above.

In both Europe and North America, species of a diversity of form will be placed in the genus *Zygina* as here defined. Some of the species are large and robust, as the *ceonothana* group of North America, and Ribaut's (1936b) *lunaris* group of Europe; while some from the Palearctic fauna and some from the Nearctic fauna are as small and delicate in appearance as true *Erythroneura*. Most of the Western Hemisphere forms possess two pygofer hooks on each side of the pygofer, one arising from the dorsal (mesal) margin, the other from the posteroventral margin, and in this respect they are distinct from other *Zygina* species examined.

In Europe, the gap sundering *Zygina* from *Erythroneura* is a narrow one. The European *Erythroneura* of the (*parvula*) = *ribauti* group of Ribaut (1936b) approaches a condition which may have given rise to *Erythroneura* (*sens. lat.*). In the *ribauti* group, the style apices are distinctly modified through the incorporation of what is believed to be a second apical extension (although the writer was not able to distinguish a clear line of demarcation between first and second extensions in *E. ribauti*, the only species available for study from this group). Species of this group are robust, with the general facies of some European *Zygina* and Nearctic *Zygina* of the *ceonothana* group. The pygofer of *E. ribauti* has a "jointed" pygofer hook identical with Nearctic *Erythroneura* of the *obliqua* group, and the relationship is further strengthened by the occurrence of a basal ventral, aedeagal membranelike expansion so characteristic of the Nearctic *obliqua* group.

The second apical extension of the style, the presence of which distinguishes *Erythroneura* from *Zygina*, in general, appears to be an extremely plastic feature interspecifically in Nearctic *Erythro-*

neura. It appears to be constant in form in the Palaearctic *flam-migera* group of Ribaut, where it appears as a small rounded lobe. There is a possibility that *Erythroneura*, as here defined, will eventually come to be known to be as complex as *Zygina*. The North American fauna has long been known to have four closely related groups. The *flam-migera* group appears quite distinct, as does the *alneti* group from Europe, and is worthy at least of subgeneric rank. A paratype of *Zygina lubiae* China, from Sudan, the only African form studied, was dissected and found to have a very bizarre second apical extension of the style, quite distinct from anything seen in Palaearctic and Nearctic forms.

The writer has refrained from naming the Western Hemisphere *Zygina* groups, in spite of their distinctness from the type of the genus because not enough material was available from the Orient to establish discontinuity in variation.

The possible origin of the tribe is obscure. The writer has thought two hypotheses worthy of consideration. The first of these would

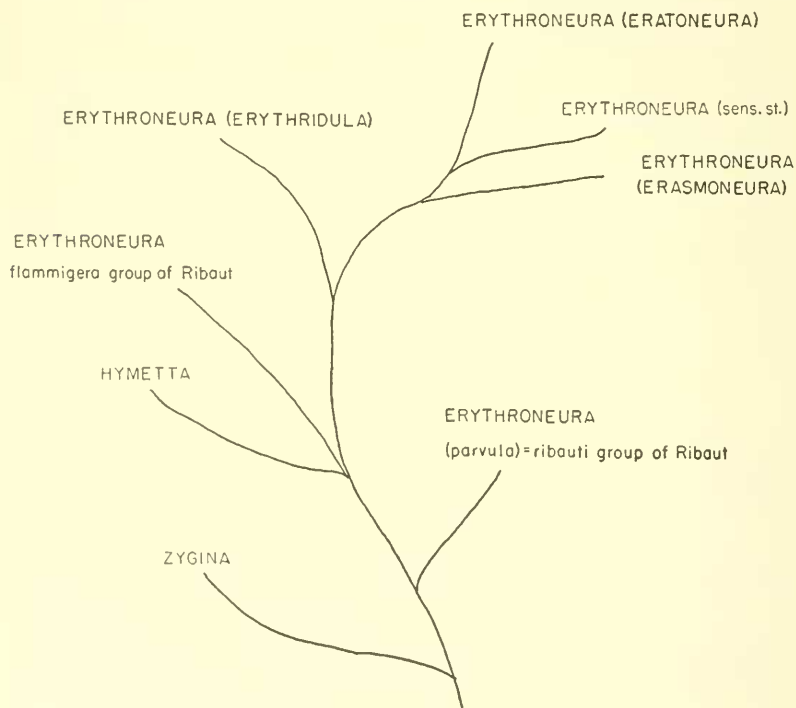


FIG. 2. Suggested relationships in Erythroneurini (the lines should be interpreted as having depth).

postulate an independent origin from the Alebrini, perhaps from Habralebralike ancestors. The extension of the style apex of an Ecuadorean species of *Habralebra* suggests a possible origin of the style pattern found in *Zygina*. An acceptance of such an idea would necessitate an assumption that a tremendous amount of parallel evolution in venation of the hind wings has occurred in the Erythroneurini and Dikraneurini.

The second, more plausible, possibility is that of an origin somewhere in dikraneurine stock, probably among the more specialized Dikraneurini where a single apical extension of the style, the fusion of vannal veins, the loss of the submarginal vein at the wing apex, and the migration of vein Cu_2 towards the base of the wing were already established.

The relationships which have suggested themselves as a result of morphological studies in the group are presented in "tree" form in the accompanying figure (text figure 2).

KEY TO GENERA AND SUBGENERA OF ERYTHRONEURINI

1. Style apex with single apical extension broad and truncate apically (plate 3, fig. 9) *Zygina*
- Style apex with second extension or lobe of diverse forms developed from broad truncate first extension; "heel" present on style (plate 3, figs. 10-15) 2
2. Second apical cell of fore wing conspicuously broadened at apex (plate 27, fig. 72b) *Hymetta*
- Second apical cell of fore wing narrow throughout, *Erythroneura* 3
3. Base of inner apical cell of fore wing transverse (plate 28, fig. 74b); pygofer hooks C-shaped (except in *tacita*) or modified C-shaped, the ventral arm of the C elongate or bifid (plate 27, figs. 73c, f; plate 28, fig. 74g) *E. (Erythroneura)*
- Base of inner apical cell of fore wing oblique or angulate (plate 28, figs. 75b, 76b; plate 29, fig. 78b); pygofer hooks not C-shaped 4
4. Base of inner apical cell of fore wing oblique and angulate at confluence of vein Cu (plate 28, fig. 75b); pygofer hooks with narrow, basal, lightly-sclerotized jointlike region (except in *tecta*); pygofer with distinct group of setae just dorsad of outer basal angle of male plate (plate 28, fig. 75c) *E. (Erasmoneura)*
- Base of inner apical cell of fore wing oblique but not angulate at confluence of vein Cu (plate 28, fig. 76b; plate 29, fig. 78b); pygofer hooks without a narrow, jointlike basal portion, or if such a joint is present (plate 29, fig. 77f), then group of setae on pygofer just dorsad of outer basal angle of male plate is weak or vestigial (plate 29, fig. 77c) 5
5. Cu of fore wing confluent with base of inner apical cell near its outer basal angle (plate 29, fig. 78b); pygofer hooks slender

and elongate, simple or bifid, without a basal, lightly-sclerotized jointlike portion; pygofer with distinct group of setae just dorsad of outer basal angle of male plate (plate 29, fig. 78c); inner apical cell of fore wing usually with dark spot in base *E. (Eratoneura)*

Cu of fore wing confluent with base of inner apical cell at point considerably mesad of its outer basal angle (plate 28, fig. 76b); pygofer hooks short, cuspidate, with basal lightly-sclerotized jointlike portion near their origin on mesal pygofer margin (plate 29, fig. 77f); group of vestigial setae (filiform under high magnification) on pygofer just dorsad of outer basal angle of male plate (plate 29, fig. 77c); inner apical cell of fore wing usually without a basal dark spot *E. (Erythrídula)*

Genus *Zygina* Fieber

(Pl. 3, fig. 9; pl. 26, fig. 70; pl. 27, fig. 71)

Zygina Fieber. Vehr. zool-bot. Ges. Wien, vol. 16, p. 509, 1866.

Idia Fieber (nec Huebner). loc. cit. (type, *Typhlocyba scutellaris* Her.-Sch. (monobasic, the other included species being a synonym)).

Zyginidia Haupt (new name for *Idia* Fieber). Zool. Jahrb. (Abt. Syst.) vol. 58, p. 268. 1929 (type, *Typhlocyba scutellaris* Her.-Sch., by original designation).

Erythroneura Fitch, in part, of authors.

Type of the genus, *Typhlocyba nivea* Mulsant and Rey (monotypic).

Hind wings: vannal veins fused; submarginal vein absent at wing apex, confluent with apex of vein Cu_1 apically; posterior branch of R fused with vein M_{1+2} ; vein Cu_2 confluent with submarginal vein in basal half of wing.

Fore wings: inner apical cell with base oblique to obliquely angulate, more proximad than base of second apical cell; second apical cell much narrower than either adjoining apical cell; third apical cell broad; outer apical cell short and small, not attaining wing apex.

Genital capsule: male plate, in ventral aspect, with oblique row of few microsetae over basal portion, in lateral aspect with submarginal row of microsetae, often stout; pygofer, in lateral aspect, lacking macrosetae, with microsetae variously arranged, frequently with distinct group of microsetae on disc dorsad of outer basal angle of male plate or dorsad of basal portion of lateral margin of male plate; pygofer hooks present, arising dorsally from the mesal margin, or ventrally from the posteroventral margin, or both (both usually present in Western Hemisphere species).

Internal male genitalia: style with distinct preapical lobe and single truncate flat apical extension, without second apical extension

(except in *kiperi*); connective U- or V-shaped, occasionally papilionaceous in form; aedeagus of varied form and with varied processes or without processes.

As pointed out earlier in the discussion under the tribal heading, the genus, as it now stands, is a large complex. The species are greatly variable in shape, from broad and robust to narrow and delicate. They are greatly variable in color markings. In *Z. kiperi*, the style exhibits a second extension, which from its form, is believed to be of origin independent from that which led to *Erythroneura*.

Oman (1949) has already pointed out that the North American species are capable of subdivision.

The following key will separate the Western Hemisphere species groups. An undescribed Argentine species belongs to the *ceonothana* group.

KEY TO GROUPS OF WESTERN HEMISPHERE ZYGINA

- Broad robust leafhoppers; head in dorsal aspect with anterior margin broadly rounded, with two conspicuous black spots on crown; pleural portion of pronotum narrower than ocellocular area *ceonothana* group
- Less broad and robust; head more produced medially; spots on crown wanting or less pronounced; pleural portion of pronotum broader than ocellocular area..... *ritana* group

Ceonothana group

- Zygina* albluta (McAtee), 1924d: 132 (*Erythroneura*), new combination
- Zygina* apache (Baker), 1925b: 537 (*Erythroneura*), new combination
- Zygina* arida (Beamer), 1937b: 31 (*Erythroneura*), new combination
- Zygina* balli (Beamer), 1932i: 125 (*Erythroneuro*), new combination
- Zygina* bimaculata (Baker), 1903d: 9 (*Typhlocyba*), new combination
- Zygina* ceonothana (Beamer), 1934c: 287 (*Erythroneura*), new combination
- Zygina* davisii (Beamer), 1934d: 96 (*Erythroneura*), new combination
- Zygina* huachucana (Beamer), 1934c: 287 (*Erythroneura*), new combination
- Zygina* penapacha (Beamer), 1941a: 18 (*Erythroneura*), new combination
- Zygina* quadricornis (Beamer), 1930b: 431 (*Erythroneura*), new combination

Ritana group

- Zygina* ales (Beamer), 1932i: 124 (*Erythroneura*), new combination
- Zygina* aprica (McAtee), 1924d: 132 (*Erythroneura*), new combination
- Zygina* aucta (McAtee), 1920a: 279 (*Erythroneura*), new combination
- Zygina* bilocularis (Van Duzee), 1924a: 233 (*Erythroneura*), new combination
- Zygina* canyonensis (Beamer), 1929b: 120 (*Erythroneura*), new combination
- Zygina* casta (Beamer), 1929b: 118 (*Erythroneura*), new combination
- Zygina* cimarroni (Beamer), 1929b: 119 (*Erythroneura*), new combination
- Zygina* cornigera (Beamer), 1937b: 31 (*Erythroneura*), new combination
- Zygina* dentata (Gillette), 1898a: 765 (*Typhlocyba*), new combination

- Zygina erosa* (McAtee), 1924c: 36 (*Erythroneura*), new combination
Zygina grandis (Beamer), 1929b: 127 (*Erythroneura*), new combination
Zygina illinoiensis (Gillette), 1898a: 758 (*Typhlocyba*), new combination
Zygina inclita (Beamer), 1934a: 44 (*Erythroneura*), new combination
Zygina inornata (McAtee), 1924d: 132 (*Erythroneura*), new combination
Zygina kiperi (Beamer), 1929b: 124 (*Erythroneura*), new combination
Zygina merita (Beamer), 1932i: 127 (*Erythroneura*), new combination
Zygina milleri (Beamer), 1929b: 125 (*Erythroneura*), new combination
Zygina nicholi (Beamer), 1927a: 30 (*Erythroneura*), new combination
Zygina novella (Knull and Auten), 1938a: 536 (*Erythroneura*), new combination.
Zygina obscura (Beamer), 1929b: 117 (*Erythroneura*), new combination
Zygina oculata (McAtee), 1924e: 39 (*Erythroneura*), new combination
Zygina pallenta (Beamer), 1929b: 117 (*Erythroneura*), new combination
Zygina pinalensis (Beamer), 1929b: 119 (*Erythroneura*), new combination
Zygina ritana (Beamer), 1934c: 286 (*Erythroneura*), new combination
Zygina rubicunda (Beamer), 1929b: 126 (*Erythroneura*), new combination
Zygina tergemina (Van Duzee), 1924a: 235 (*Erythroneura*), new combination
Zygina ternaria (Van Duzee), 1924a: 232 (*Erythroneura*), new combination
Zygina triceroprocta (Beamer), 1929b: 118 (*Erythroneura*), new combination
Zygina tricolor (Beamer), 1929b: 124 (*Erythroneura*), new combination
Zygina tripunctata (Beamer), 1929b: 124 (*Erythroneura*), new combination
Zygina unicolor (Beamer), 1929b: 120 (*Erythroneura*), new combination
Zygina utahna (Beamer), 1937b: 32 (*Erythroneura*), new combination

The following species of *Zygina* have not been studied, and cannot, therefore, be placed in the appropriate grouping above.

- Zygina agnata* (Knull and Auten), 1938a: 537 (*Erythroneura*), new combination
Zygina arizonica (Knull and Auten), 1938a: 536 (*Erythroneura*), new combination
Zygina blanda (Knull and Auten), 1938a: 538 (*Erythroneura*), new combination
Zygina modula (Knull and Auten), 1938a: 535 (*Erythroneura*), new combination.
Zygina munda (Knull and Auten), 1938a: 534 (*Erythroneura*), new combination
Zygina nuda (Knull and Auten), 1938a: 538 (*Erythroneura*), new combination
Zygina sola (Knull and Auten), 1938a: 534 (*Erythroneura*), new combination
Zygina spectabilis (Knull and Auten), 1938a: 533 (*Erythroneura*), new combination

Genus *Hymetta* McAtee

(Pl. 27, fig. 72)

Hymetta McAtee. Proc. Biol. Soc. Washington, vol. 32, p. 121, 1919.

Type of the genus, *Tettigonia trifasciata* Say, by original designation.

Hind wings: as in *Zygina*.

Fore wings: inner apical cell broader at base than second or third apical cells, its base oblique or obliquely angulate; *second apical cell conspicuously wider at apex than at base*; third apical cell widened apically; outer apical cell short, quadrilateral, not attaining wing margin.

Genital capsule: male plate, in ventral aspect, narrowed on lateral margin near middle its length, apex rounded, with oblique row of few macrosetae over disc laterally on basal portion; in lateral aspect, plate with submarginal irregular row of microsetae parallel to lateral margin, and with number of irregularly arranged microsetae over distal half; pygofer, in lateral aspect, with group of small setae dorsad of outer basal angle of male plate, few smaller setae cephalad of posterior margin, and irregularly arranged microsetae; pygofer hook short, arising from mesal pygofer margin, extending mesad free from pygofer wall through most its length, its base without a jointlike, lightly-sclerotized portion.

Internal male genitalia: style with broad conspicuous preapical lobe and apical footlike extension, the "toe" apparently formed by a small second extension, preapical lobe with small group of discal microsetae; connective short, Y-shaped with stem turned dorsad, the aedeagal articulation subterminal; aedeagus with well developed preatrium, shaft surmounting and roughly parallel to pair of more ventral preatrial processes.

The species are robust. In dorsal aspect, the head including the eyes is narrower than the pronotum, and well produced medially to the rounded apex of the crown. The lateral margins of the pronotum are divergent posteriorly, and the posterior margin is shallowly concave. In lateral aspect, the line of the face is smoothly convex, and divergent from the line of the dorsum. The pleural portion of the pronotum is broader than the ocellocular area. The scutellum, in lateral aspect, is elevated posteriorly, a character which has been overemphasized heretofore, for its use in a key frequently leads to erroneous results. The species are beautifully marked with dusky bands on a cream-colored background and frequently with orange to red spots. The identity of the species is in a state of confusion, at present, and a revision is greatly needed.

This genus is closely related to *Erythroneura*, and has a distribution which is primarily Nearctic.

Hymetta anthisma McAtee, 1919a: 123.

Hymetta arizoniana Fairbairn, 1928a: 90

Hymetta balteata McAtee, 1919a: 123

distincta Fairbairn, 1928a: 87, new synonymy

Hymetta kansasensis Fairbairn, 1928a: 90

Hymetta trifasciata (Say), 1825a: 343 (*Tettigonia*) (*fide* Oman)

Genus *Erythroneura* Fitch

Erythroneura Fitch. Ann. Rep. New York St. Cab. Nat. Hist., p. 62. 1851.

Type of the genus, *Erythroneura tricincta* Fitch, by subsequent designation of Oshanin, 1912.

Hind wings: as in *Zygina*.

Fore wings: base of inner apical cell oblique, angulate, or transverse; vein Cu confluent with base of inner apical cell at a point varying from its center to its outer extremity; *second apical cell* narrow, with sides subparallel; third apical cell usually quadrilateral, rarely triangular; outer apical cell not attaining wing apex; bases of apical cells forming a variable pattern, together appearing nearly as a transverse line, a jagged diagonal line, or a line concave at its mid-length.

Genital capsule: plate with oblique row of macrosetae; pygofer with group of setae dorsad of outer basal angle of male plate, more or less distinct; pygofer hook arising from mesal pygofer margin, greatly variable in form.

Internal male genitalia: style with second apical extension always present; second apical extension of extremely variable form interspecifically; connective U-shaped or V-shaped with the apex turned dorsad, the aedeagal articulation usually subterminal; aedeagal form varied.

As the genus now stands, it is of inconvenient size. Probably the reason it has not been subdivided heretofore is that careful study reveals such a bewildering array of variations and intergrades as to render its separation into discontinuous groups exceedingly difficult. In the opinion of the writer, with the exception of the forms which have been relegated to *Zygina*, it is as it has been considered to date—a very large complex of closely related species.

For years, the group has been subdivided into groups of species on the basis of the form of the base of the inner apical cell of the fore wing. Beamer (1936) has pointed out that this character is subject to some variation within species, and is not infallible. Nevertheless, after considerable study, it appears likely that the groups of species based on this character are probably more natural than several other possible groupings, and more clear-cut. Some supporting characters have been found for these groups, and they are retained here, as subgenera.

The subgenera permit further subdivision, but the resulting groups leave much doubt as to whether natural relationships result.

Erythroneura subgenus *Erythroneura* Fitch

(Pl. 27, fig. 73; pl. 28, fig. 74)

See reference under generic heading.

Type of the subgenus, *Erythroneura tricincta* Fitch, by subsequent designation of Oshanin, 1912.

Hind wings: as in generic description.

Fore wings: bases of apical cells forming a transverse line which may be irregular; *base of inner apical cell transverse, seldom oblique, apex of vein Cu confluent with base of inner apical cell at or near its outer basal angle.*

Genital capsule: pygofer with a distinct group of setae just dorsad of outer basal angle of male plate; *pygofer hooks C-shaped, the dorsal arm of the hook formed by a gradual increase in sclerotization of the mesal pygofer margin, lacking a thinner, weakened basal "joint," occasionally with ventral arm greatly elongate or bifid (dorsal arm wanting in tacita).*

Internal male genitalia: aedeagus variable in form, in some species with elongate preatrium bearing paired processes and with short dorsoventrally flattened shaft; in other species preatrium short or wanting and the shaft cylindrical and with or without processes; other characters as in generic description.

It is possible to further subdivide the subgenus on the basis of the shape of the aedeagus, the shape of the style, and the form of the pygofer hook. Most such groupings reveal intergrades.

In the list of species which follows, the species which has not been studied by the writer is indicated by an asterisk.

Erythroneura aclys McAtee, 1920a: 290

Erythroneura acuticephala Robinson, 1924a: 61

Erythroneura amanda McAtee, 1920a: 319

Erythroneura ancora Beamer, 1929b: 122

Erythroneura anfracta Beamer, 1929b: 123

Erythroneura aza Robinson, 1924c: 291

Erythroneura beameri Robinson, 1924a: 61

Erythroneura bidens McAtee, 1924c: 39

Erythroneura bistrata McAtee, 1920a: 305

Erythroneura caetra McAtee, 1924d: 133

Erythroneura calycula McAtee, 1920a: 308

Erythroneura cancellata McAtee, 1920a: 320

Erythroneura coloradensis (Gillette), 1892a: 16 (*Typhlocyba*)

Erythroneura comes (Say), 1825a: 343 (*Tettigonia*)

Erythroneura compta McAtee, 1920a: 318

- Erythroneura corni* Robinson, 1924a: 60
Erythroneura cymbium McAtee, 1920a: 310
Erythroneura delicata McAtee, 1920a: 317
Erythroneura diva McAtee, 1920a: 308
Erythroneura elegans McAtee, 1920a: 315
Erythroneura elegantula Osborn, 1928a: 289
Erythroneura festiva Beamer, 1938a: 290
Erythroneura fraxa Robinson, 1924c: 292
Erythroneura gilensis Beamer, 1929b: 123
Erythroneura infuscata (Gillette), 1898a: 764 (*Typhlocyba*)
Erythroneura integra McAtee, 1920a: 309
Erythroneura kanwakae Robinson, 1924c: 292
Erythroneura kennedyi Knull, 1945a: 109
Erythroneura nudata McAtee, 1920a: 316
 **Erythroneura octonotata* Walsh, 1862a: 149
Erythroneura omaska Robinson, 1924a: 62
Erythroneura ontari Robinson, 1924a: 60
Erythroneura palimpsesta McAtee, 1924e: 43
Erythroneura pontifex McAtee, 1926c: 136
Erythroneura prima Beamer, 1938a: 283
Erythroneura prosata Johnson, 1935a: 108
Erythroneura reflecta McAtee, 1924e: 43
Erythroneura rosa Robinson, 1924a: 58
Erythroneura rubra (Gillette), 1898a: 764 (*Typhlocyba*)
Erythroneura rubrella McAtee, 1920a: 316
Erythroneura tacita Beamer, 1938a: 293
Erythroneura tricineta Fitch, 1851a: 63
Erythroneura vaga Johnson, 1934a: 260
Erythroneura vagabunda Knull, 1945a: 109
Erythroneura vitifex Fitch, 1856a: 392
Erythroneura vitis (Harris), 1831a: 43 (*Tettigonia*) (*fide* Oman)
Erythroneura ziczac Walsh 1862a: 149

Erythroneura subgenus *Erasmoneura*, nov.

(Pl. 28, fig. 75)

Type of the subgenus, *Erythroneura vulnerata* Fitch.

Hind wings: As in *Zygina*.

Fore wings: as in subgenus *Erythroneura*, but base of inner apical cell angulate, rarely rectilinear and transverse; Cu confluent with base of inner apical cell near its midpoint.

Genital capsule: pygofer with distinct group of setae just dorsad of outer basal angle of male plate; pygofer hook simple or bifid, with basal lightly-sclerotized jointlike portion (except in *tecta*); other characters as in generic description.

Internal male genitalia: style with second apical extension obvious, greatly variable in form interspecifically; aedeagal shaft extremely short, with various processes; preatrium usually troughlike

in form; aedeagal connections to pygofer hooks very strong, even in macerated specimens.

This is the "vulnerata" group of authors. Its affinities are enigmatic. The pygofer hooks and their strong connections to the aedeagus are suggestive of subgenus *Erythridula*, whereas the reduction in the length of the shaft of the aedeagus is suggestive of the condition found in the subgenus *Eratoneura*.

A list of Western Hemisphere species follows. All of the species listed are Nearctic. All have been studied by the writer.

- Erythroneura atrata* Johnson, 1935a: 97
- Erythroneura bicolorata* Beamer, 1937a: 11
- Erythroneura bipentagona* Beamer, 1927a: 31
- Erythroneura caerulea* Beamer, 1937a: 10
- Erythroneura calva* Beamer, 1946a: 22
- Erythroneura carbonata* McAtee, 1920a: 289
- Erythroneura fulmina* McAtee, 1920a: 274
- Erythroneura mixta* Beamer, 1932j: 183
- Erythroneura nigerrima* McAtee, 1920a: 275
- Erythroneura nigra* (Gillette), 1898a: 765 (*Typhlocyba*)
- Erythroneura rubricata* (Van Duzee), 1909a: 229 (*Typhlocyba*)
- Erythroneura tecta* McAtee, 1920a: 288
- Erythroneura variabilis* Beamer, 1929b: 126
- Erythroneura vulnerata* Fitch, 1851a: 61

Erythroneura subgenus *Erythridula*, nov.

(Pl. 28, fig. 76; pl. 29, fig. 77)

Type of the subgenus, *Tettigonia obliqua* Say.

Hind wings: as in *Zygina*.

Fore wings: as in subgenus *Erythroneura*, but base of inner apical cell oblique, and Cu confluent with base of inner apical cell at point near middle its length.

Genital capsule: pygofer with indistinct group of microsetae just dorsad of outer basal angle of male plate, the setae visible only under very high magnification and not conspicuously differentiated from other similar setae on pygofer; pygofer hook short and cuspidate, dorsal in origin, not arising as uniform increase in sclerotization, with basal lightly-sclerotized articular area appearing as joint at dorsal basal portion of hook, ventral base of hook joined to dorsal aedeagal apodeme by strong connections frequently visible even in cleared specimens.

Internal male genitalia: style with second apical extension of form greatly variable interspecifically (and occasionally intraspecifically); connective V-shaped, its apex turned dorsad, the aedeagal articulation subterminal; aedeagus variable in form, the basal portion usu-

ally broadly expanded just distad of articulation with connective, the expansion rarely wanting, shaft never thecate, usually with paired processes arising at or near its base and these separate from, completely joined to, or partially joined to shaft.

It is possible to subdivide the subgenus on the basis of the style apices (but these are extremely variable structures between species, and Beamer and Griffith (1935a) have shown one instance of intra-specific variation), or on the basis of the form of the base of the aedeagus, or on the basis of the form of the shaft. It is open to question whether such subdivisions would be natural ones, and they seem undesirable until they can be supported by more biological data than now exist.

In the following list of species, those not studied have been prefixed with an asterisk. All of the listed species are Nearctic.

- **Erythroneura abolla* McAtee, 1920a: 285
- Erythroneura accurata* Beamer, 1934b: 18
- Erythroneura acicularis* Beamer, 1932i: 126
- **Erythroneura ador* McAtee, 1918b: 361
- Erythroneura aenea* Beamer, 1930b: 436
- Erythroneura afflicta* Beamer, 1935a: 101
- Erythroneura alata* (?) Knull, 1946a: 45
- Erythroneura albescens* Beamer, 1930b: 443
- Erythroneura amabilis* McAtee, 1924d: 132
- Erythroneura angularis* Beamer, 1930b: 447
- **Erythroneura anomala* Knull, 1946a: 46
- Erythroneura apta* Beamer, 1935a: 102
- Erythroneura aspera* Beamer and Griffith, 1935a: 18
- Erythroneura atrimucronata* Beamer, 1930b: 424
- Erythroneura autenae* Johnson, 1935a: 73
- Erythroneura bicornis* Beamer, 1930b: 450
- Erythroneura bitincta* McAtee, 1926c: 130
- Erythroneura brundusa* Rob. 1924b: 155
- **Erythroneura caldwelli* Johnson, 1935a: 69
- Erythroneura cauta* Beamer, 1935a: 100
- Erythroneura cavena* Auten and Johnson, 1936a: 61
- **Erythroneura celebrata* Johnson, 1935a: 82
- Erythroneura clavata* (DeLong), 1916a: 105 (*Typhlocyba*)
- Erythroneura coarctata* Beamer, 1930b: 436
- **Erythroneura complicata* Johnson, 1935a: 87
- **Erythroneura contrasta* Auten and Johnson, 1936a: 62
- Erythroneura cornipes* Beamer, 1930b: 449
- Erythroneura cotidiana* Beamer, 1930b: 433
- **Erythroneura crataegi* Johnson, 1935a: 61
- Erythroneura crevecocuri* (Gillette), 1898a: 767 (*Typhlocyba*)
- Erythroneura cruciformis* Beamer, 1930b: 443
- Erythroneura cuneata* Beamer, 1930b: 433
- **Erythroneura decorata* Auten and Johnson, 1936a: 63

- Erythroneura diffusa* Beamer, 1930b: 434
 •*Erythroneura divisa* McAtee, 1924c: 37
Erythroneura dolosa Beamer and Griffith, 1935a: 19
Erythroneura dowelli Beamer, 1932b: 62
Erythroneura electa McAtee, 1920a: 282
Erythroneura eluta McAtee, 1920a: 277
Erythroneura extima Beamer, 1939a: 29
Erythroneura falcata Beamer, 1930b: 432
 •*Erythroneura fragilis* Johnson, 1935a: 93
Erythroneura fumida (Gillette), 1898a: 758 (*Typhlocyba*)
Erythroneura funesta Beamer, 1930b: 441
Erythroneura fureillata Beamer, 1930b: 452
Erythroneura gleditsia Beamer, 1930b: 437
Erythroneura hamata Beamer, 1930b: 446
Erythroneura harpax Beamer, 1930b: 432
Erythroneura iconica McAtee, 1920a: 287
Erythroneura idonea Beamer, 1935a: 100
 •*Erythroneura inconspicua* Johnson, 1935a: 90
Erythroneura insigna Beamer and Griffith, 1935a: 17
 •*Erythroneura intricata* Johnson, 1935a: 86
Erythroneura jocosu Beamer, 1935a: 101
Erythroneura juglandis Knull and Auten, 1938a: 532
Erythroneura juncea Beamer, 1937a: 10
Erythroneura kanza Robinson 1924a: 58
Erythroneura latapex Beamer, 1930b: 447
Erythroneura lawsoniana Baker, 1926a: 347
 •*Erythroneura lusoria* Van Duzee, 1924a: 234
Erythroneura magnacalx Beamer, 1930b: 451
Erythroneura malleiformis Beamer, 1930b: 449
Erythroneura mansucta Beamer, 1935a: 98
 •*Erythroneura minima* Johnson, 1935a: 92
 •*Erythroneura minuta* Johnson, 1935a: 93
Erythroneura modica Beamer, 1930b: 448
Erythroneura nava Beamer, 1935a: 102
Erythroneura nitida Beamer, 1935a: 103
Erythroneura noeva (Gillette), 1898a: 757 (*Typhlocyba*)
 •*Erythroneura nondescripta* Johnson, 1935a: 92
Erythroneura obliqua (Say), 1825a: 342
Erythroneura obvia Beamer, 1930b: 439
Erythroneura ohioensis Knull, 1945a: 108
Erythroneura parvispicata Beamer, 1930b: 435
Erythroneura penclutea Beamer, 1930b: 427
Erythroneura peneoeva Beamer, 1930b: 438
Erythroneura penobliqua Beamer, 1930b: 453
Erythroneura perita Beamer, 1935a: 99
Erythroneura plena Beamer, 1930b: 442
 •*Erythroneura ponderosa* Auten and Johnson, 1936a: 62
 •*Erythroneura praecisa* Knull, 1946a: 46
Erythroneura quadrata Beamer, 1930b: 435
 •*Erythroneura repleta* Johnson, 1935a: 78

- Erythroneura rubens* Beamer, 1930b: 439
Erythroneura rubrataeniensis Beamer, 1930b: 440
Erythroneura rubroscuta (Gillette), 1898a: 755 (*Typhlocyba*)
Erythroneura rubrotincta Johnson, 1935a: 91
Erythroneura rufostigmata Beamer, 1930b: 429
Erythroneura sagittata Beamer, 1930b: 440
Erythroneura scissa Beamer, 1930b: 448
 **Erythroneura scythia* Auten and Johnson, 1936a: 61
 **Erythroneura sincera* Johnson, 1935a: 94
 **Erythroneura sinua* Johnson, 1935a: 82
Erythroneura spatulata Beamer, 1930b: 444
 **Erythroneura spearca* Auten and Johnson, 1936b: 818
Erythroneura stolata McAtee, 1920a: 279
 **Erythroneura stulta* Auten and Johnson, 1936a: 64
 **Erythroneura stylata* Johnson, 1935a: 78
Erythroneura tenebrosa Knull, 1946a: 48
Erythroneura tenuispica Beamer, 1930b: 444
Erythroneura torva Beamer, 1935a: 98
Erythroneura tridens Beamer, 1930b: 450
Erythroneura unicuspidis Beamer, 1930b: 452
 **Erythroneura varia* McAtee, 1920a: 287
Erythroneura victorialis (?) Knull, 1946a: 49
Erythroneura vinaria Beamer, 1930b: 426
Erythroneura volucris Beamer, 1930b: 445
Erythroneura xanthocephala Robinson, 1924d: 220

Erythroneura subgenus *Eratoneura*, nov.

(Pl. 29, fig. 78)

Type of the subgenus, *Erythroneura dira* Beamer.

Hind wings: as in *Zygina*.

Fore wings: base of inner apical cell varying from nearly transverse to oblique or subangulate, but most often oblique; vein Cu attaining base of inner apical cell near outer basal angle of cell, occasionally at point more mesad; otherwise as in subgenus *Erythroneura*.

Genital capsule: pygofer with distinct group of setae just dorsad of outer basal angle of male plate; pygofer hook simple or bifid, usually long and slender, arising as gradual thickening of mesal pygofer margin, without a basal, lightly-sclerotized jointlike portion; other features as in typical subgenus.

Internal male genitalia: style apex of various forms, but always with the second apical extension present; connective V-shaped with apex turned dorsad, the aedeagal articulation subterminal; aedeagal preatrium elongate and shaft short (except in *ballista* and *hartii*), usually cylindrical and with rugae or minute verrucose projections;

aedeagus usually without processes either on preatrium or on shaft.

The species included here appear more robust than those of other subgenera, and most of them possess a dark spot in the base of the inner apical cell of the fore wing. They constitute what has been called the "maculata group" of *Erythroneura*. *E. maculata* has not been selected as the type because in some respects it is not typical of the group.

The subgenus, as characterized above, permits further subdivision on the basis of the form of the aedeagus. As pointed out in the above description, the aedeagal shaft is typically warty, or at least rugose, a peculiar development which does not occur in allied groups. Moreover, this modification of the aedeagal shaft is associated usually with the lack of paired processes so frequently associated (often partially fused) with the shaft in subgenus *Erythridula*. It seems probable, from a study of the shaft in lateral view, under high magnification, in prepared slides, that these ventrolateral processes have entered into the constitution of the verrucose portion. The structure of the shaft of *Erythroneura* (*Eratoneura*) *nevadensis* (plate 29, fig. 78f) suggests that a complicating feature occurs. In this species, the two typical ventrolateral processes are expanded and flat, while arising *dorsad* of the base of the shaft is a flat hood-like unpaired process which bears prominences typical of those which cover the shaft, or partially cover it, in most other species of the subgenus. The dorsal "hood" and the ventrolateral flat processes are fused laterad of the base of the shaft, so that the shaft, in lateral view, appears partially enclosed by one dorsal and two ventral processes, but not entirely enclosed, except for a very short basal portion. The unenclosed portion of the shaft lacks rugae or minute verrucae. Many other species, in which the shaft is verrucose or rugose, in lateral view, exhibit a gonoduct in which the outline is complicated basally in a manner suggestive of a line of fusion such as might exist if the three processes of *nevadensis* were more intimately fused. If this is true, the shaft is thecate in such species.

The relationship of the processes of *nevadensis* to the rugose shaft without processes presents a fascinating problem, the solution of which cannot be undertaken here. One group of species, here designated the *crinita* group, possesses processes *plus* a rugose or verrucose shaft. In all of the species of the *crinita* group, the position or the origin of the processes suggests that they have arisen independently and are not the homologues of the ventrolateral processes of *nevadensis*. Such species undoubtedly represent an unnatural

group and are placed together here merely for taxonomic convenience.

A second subdivision is founded on a group of species which have an aedeagal shaft which lacks ornamentation of the sort found in the more typical members of the group. It is here designated the *non-cuspidis* group, and like the preceding, probably does not represent closely related species, although *marra*, *gillettei*, *maculata*, and *non-cuspidis* have many features in common.

In the species lists which follow, those species not studied by the author have been prefixed with an asterisk.

Dira group

- Erythroneura abjecta Beamer, 1931d: 288
- Erythroneura accola McAtee, 1920a: 299
- Erythroneura aculeata Beamer, 1932g: 161
- Erythroneura adunca Beamer, 1932c: 46
- Erythroneura aesculi Beamer, 1932c: 46
- Erythroneura affinis Fitch, 1851a: 63 (*vide* Oman)
- Erythroneura ardens McAtee, 1920a: 299
- Erythroneura arta Beamer, 1931d: 287
- Erythroneura basilaris (Say), 1825a: 344 (*Tettigonia*)
- Erythroneura bella McAtee, 1920a: 300
- Erythroneura bifida Beamer, 1931a: 134
- Erythroneura bigemina McAtee, 1920a: 300
- Erythroneura biramosa Beamer, 1941a: 18
- Erythroneura bispinosa Beamer, 1931b: 241
- Erythroneura brevipes Beamer, 1931a: 133
- Erythroneura calamitosa Beamer, 1931b: 241
- Erythroneura californica Beamer, 1932f: 143
- Erythroneura campora Robinson, 1924a: 59
- Erythroneura carmini Beamer, 1929b: 121
- Erythroneura certa Beamer, 1932g: 159
- Erythroneura clara Beamer, 1932g: 161
- Erythroneura clavipes Beamer, 1931c: 269
- Erythroneura concisa Beamer, 1931d: 286
- Erythroneura confirmata McAtee, 1924c: 37
- Erythroneura consueta Beamer, 1932d: 71
- Erythroneura contracta Beamer, 1931a: 130
- * Erythroneura corylorubra Knull, 1945a: 108
- Erythroneura curta Beamer, 1932e: 86
- Erythroneura curvata Beamer, 1931a: 132
- Erythroneura delongi Knull and Auten, 1937a: 574
- Erythroneura dira Beamer, 1931d: 286
- * Erythroneura direpta Knull, 1949a: 125
- Erythroneura dumosa Beamer, 1932a: 13
- * Erythroneura cra McAtee, 1920a: 299
- Erythroneura externa Beamer, 1931d: 289

- Erythroneura facota* Beamer, 1932d: 70
Erythroneura firma Beamer, 1932a: 12
 * *Erythroneura flexibilis* Knull, 1949a: 122
Erythroneura forfex Beamer, 1932e: 82
Erythroneura gemina McAtee, 1920a: 301
Erythroneura hyalina Knull and Auten, 1937a: 575
 * *Erythroneura hymac* Robinson, 1924a: 60
Erythroneura immota Beamer, 1932a: 16
Erythroneura impar Beamer, 1931a: 133
Erythroneura incondita Beamer, 1932a: 16
Erythroneura inepta Beamer, 1932g: 162
Erythroneura ingrata Beamer, 1932g: 160
Erythroneura interna Beamer, 1931d: 285
Erythroneura knighti Beamer, 1932e: 87
Erythroneura lawsoni Robinson, 1924a: 59
Erythroneura lenta Beamer, 1932e: 82
Erythroneura ligata McAtee, 1920a: 301
Erythroneura linea Beamer, 1932c: 47
 * *Erythroneura luculenta* Knull, 1949a: 124
Erythroneura lunata McAtee, 1924e: 41
Erythroneura macra Beamer, 1932a: 15
 * *Erythroneura malaca* Knull, 1949a: 126
Erythroneura manus Beamer, 1932e: 83
Erythroneura mensa Beamer, 1931d: 287
Erythroneura minor Beamer, 1932e: 84
Erythroneura mira Beamer, 1932c: 45
Erythroneura mirifica Beamer, 1932g: 159
Erythroneura misera Beamer, 1932g: 158
Erythroneura morgani (DeLong), 1916a: 104 (*Typhlocyba*)
Erythroneura nevadensis Beamer, 1932d: 72
Erythroneura nigriventer Beamer, 1931a: 134
Erythroneura omani Beamer, 1930a: 49
Erythroneura opulenta Beamer, 1932c: 48
Erythroneura parallela McAtee, 1924c: 38
Erythroneura parva Beamer, 1932d: 70
Erythroneura parvipes Beamer, 1931b: 242
Erythroneura penesica Beamer, 1931c: 269
 * *Erythroneura perplexa* Knull, 1944b: 123
Erythroneura propria Beamer, 1932a: 13
Erythroneura pyra McAtee, 1924d: 133
Erythroneura restricta Beamer, 1932c: 45
Erythroneura retusa Beamer, 1932c: 48
Erythroneura rotunda Beamer, 1931d: 288
Erythroneura rubranotata Beamer, 1927a: 30
Erythroneura rubraza Robinson, 1924c: 291
Erythroneura septima Beamer, 1927a: 30
 * *Erythroneura severini* Knull, 1949a: 125
Erythroneura solita Beamer, 1932a: 14
Erythroneura spinifera Beamer, 1931b: 240

- Erythroneura stephensoni* Beamer, 1931a: 130
 ° *Erythroneura stupkaorum* Knull, 1945a: 104
Erythroneura tantilla Beamer, 1931d: 285
Erythroneura teres Beamer, 1931c: 268
Erythroneura torella Robinson, 1924b: 156
 ° *Erythroneura trautmanae* Knull, 1945a: 104
Erythroneura triangulata Beamer, 1931b: 240
Erythroneura trivittata Robinson, 1924a: 59
Erythroneura turgida Beamer, 1931b: 243
Erythroneura uncinata Beamer, 1931b: 242
Erythroneura ungulata Beamer, 1932d: 69
Erythroneura unica Beamer, 1932e: 83
Erythroneura univittata Robinson, 1924b: 156
Erythroneura usitata Beamer, 1932a: 14
 ° *Erythroneura uvaldeana* Knull, 1949a: 125
Erythroneura zioni Beamer, 1932d: 71

Crinita group

- Erythroneura crinita* Beamer, 1932e: 85
Erythroneura geronimoi Knull, 1945a: 108
Erythroneura osborni (DeLong), 1916a: 103 (*Typhlocyba*)
Erythroneura paraesculi Knull, 1945a: 106
Erythroneura sancta Beamer, 1932a: 15
Erythroneura texana Beamer, 1929b: 121

Noncuspidis group

- Erythroneura andersoni* Beamer, 1932a: 86
Erythroneura ballista Beamer, 1932e: 84
Erythroneura gillettei Beamer, 1931a: 128
Erythroneura hartii (Gillette), 1898a: 754 (*Typhlocyba*)
 ° *Erythroneura hymettana* Knull, 1949a: 124
Erythroneura lata Beamer, 1932e: 86
Erythroneura maculata (Gillette), 1898a: 764 (*Typhlocyba*)
Erythroneura marra Beamer, 1932g: 160
Erythroneura noncuspidis Beamer, 1931a: 129
Erythroneura penerostrata Beamer, 1932e: 85
Erythroneura rostrata Beamer, 1931c: 270
Erythroneura separata Beamer, 1932a: 12

The following species have not been studied, and could not be placed in the above groups from figures or descriptions.

- ° *Erythroneura compressa* Knull and Auten, 1937a: 573
 ° *Erythroneura continua* Knull and Auten, 1937a: 578
 ° *Erythroneura dimidiata* Knull, 1949a: 122
 ° *Erythroneura distincta* Knull and Auten, 1937a: 572
 ° *Erythroneura pallida* Knull and Auten, 1937a: 573
 ° *Erythroneura proluxa* Knull, 1949a: 126
 ° *Erythroneura ventura* Knull and Auten, 1937a: 577
 ° *Erythroneura vittata* Knull and Auten, 1937a: 577

TRIBE TYPHLOCYBINI

The leafhoppers of this group have hind wings in which the veins 1V and 2V are separate apically. The posterior branch of R is distinct and separate in some groups, combined with vein M_{1+2} in others, but this character is not believed to be a salient one (it would cleave the *Typhlocyba* complex from the *Eupteryx* complex, and these appear closely related in other characteristics). The submarginal vein is present or absent at the wing apex, and when present, it never extends beyond the apex of the outermost longitudinal vein whether the latter be the posterior branch of R or the fusion vein "R + M".

The apical venation of the fore wings appears to offer but slight basis for establishing relationships between genera.

The pygofer is quite varied, frequently possessing macrosetae on the disc, and frequently with pygofer hooks, and these are often ventral in origin. The occurrence of macrosetae in uniseriate groups on the male plates is rare.

The style typically lacks a preapical lobe or apical extension. Usually it is slender, tubular, and tapering, and usually possesses ungrouped setae along its length. Occasionally, a deltoid preapical protuberance occurs on the mesal margin of the style which superficially resembles the "heel" of the higher Erythroneurini, but which is probably unrelated to that structure, except for a possible functional relationship.

The aedeagus is quite varied in form. Frequently it is composed of a long preatrium and a short shaft. Various processes occur on it, and these are occasionally complex to the degree that they appear bizarre.

Several distinct complexes occur within the tribe, one about the genus *Eupteryx*, a complex which is characterized by the lack of the submarginal vein at the wing apex, and the frequent occurrence of complex aedeagal modifications. A second complex occurs about *Empoasca*, with a characteristic venation in the hind wing. A third complex occurs about the genus *Joruma*, and this one comprises the tribe Jorumini of McAtee. It appears no more worthy of tribal recognition than do either of the above complexes.

The writer can offer no suggestions as to the possible origin of the Typhlocybini. The group appears only distantly related to the Erythroneurini and the Dikraneurini. The Alebrini are insufficiently known, at this time, to form a conception of possible relationship to the Typhlocybini.

KEY TO GENERA AND SUBGENERA OF TYPHLOCYBINI

1. Hind wing with submarginal vein absent at wing apex (plate 28, fig. 74a) 2
 Hind wing with submarginal vein present at wing apex (plate 34, fig. 90a) 9
2. Hind wing with posterior branch of R not fused with apical portion of vein M_{1+2} (vein "R + M" does not occur) (plate 30, fig. 79a) 3
 Hind wing with posterior branch of R fused with apical portion of vein M_{1+2} (vein "R + M" present) (plate 33, fig. 88b) 6
3. Aedeagus asymmetrical, with an unpaired looped process (plate 30, fig. 79e) *Eupterella*
 Aedeagus symmetrical, without a looped process 4
4. Pygofer, in lateral view, with ventrad-directed process; concave margin of style lacking setae; male plate with several macrosetae (plate 30, figs. 80c, d, e) *Eupteroidea*
 Pygofer, in lateral view, with or without processes, if present, then not directed ventrad; concave margin of style with setae; male plate with or without several macrosetae 5
5. Apex of fore wing much narrower than discal portion; lower part of face, in profile, subparallel to line of dorsum; aedeagal apodeme, in caudal aspect, with opening; species robust, *Eurhadina*
 Apex of fore wing not much narrower than discal portion; lower part of face, in profile, sharply divergent from line of dorsum; aedeagal apodeme, in caudal aspect, without an opening; species slender *Eupteryx*
6. Crown with median length nearly or entirely equal to median length of pronotum; ocelli present; pygofer without group of macrosetae near outer basal angle of male plate (plate 32, fig. 85c) *Henribautia*
 Crown with median length much less than median length of pronotum; ocelli rarely present; pygofer with macrosetae near outer basal angle of male plate (plate 33, fig. 86c) (exception: *gillettei* group of *Typhlocyba*) 7
7. Aedeagal shaft a flattened membranous structure occurring between a pair of arms formed by longer forcipate atrial processes (plate 33, fig. 86e) *Ossiannilssonina*
 Aedeagal shaft strongly sclerotized, not so enclosed 8
8. Mesal margin of style with distinct preapical angular protruberance (plate 33, fig. 87e) *Ribautiana*
 Mesal margin of style without preapical angular protruberance, or if present then scarcely developed (plate 34, fig. 89d), *Typhlocyba*
9. Hind wing with posterior branch of R not fused with apical portion of vein M_{1+2} (vein "R + M" does not occur) (plate 34, fig. 90a; plate 35, fig. 91a) 10
 Hind wing with posterior branch of R fused with apical portion of vein M_{1+2} (vein "R + M" does occur) (plate 36, fig. 94a), 13

10. Hind wing with submarginal vein confluent with apex of posterior branch of R (plate 34, fig. 90a) *Eualebra*
Hind wing with submarginal vein confluent with apex of vein M_{1+2} (plate 35, fig. 91a) 11
11. Style slender, elongate, gradually curved posterolaterad, or caliperate in dorsal aspect (plate 35, fig. 91d) *Joruma* 12
Style massive, short, strongly curved mesad at apex (plate 36, fig. 93d) *Neojoruma*
12. Style, in dorsal aspect, with laterally-directed prominent spine along its length (plate 35, fig. 92d) subg. *Jorumidea*
Style, in dorsal aspect, without laterally-directed spine (seta or setae present) subg. *Joruma*
13. Hind wing with fusion of posterior branch of R with veins M_{1+2} occurring much proximad of distal third of wing (plate 36, fig. 94a) *Paulomanus*
Hind wing with fusion of posterior branch of R with vein M_{1+2} in distal third of wing (plate 38, fig. 97a) 14
14. Pygofer processes arising on posterior pygofer margin; aedeagus grossly ornamented *Beamerella*
Pygofer processes arising ventrally on pygofer; aedeagus not ornamented *Empoasca*

Genus *Eupterella* DeLong and Ruppel

(Pl. 30, fig. 79)

Eupterella DeLong and Ruppel. Ohio Journ. Sci., vol. 50, p. 239. 1950.

Type of the genus, *Eupterella mexicana* DeLong and Ruppel, by original designation.

Hind wings: submarginal vein wanting at wing apex, fused preapically with apical portion of vein Cu_1 , the portion of vein Cu_1 basad of the fusion appearing as a cross vein; posterior branch of R, vein M_{1+2} , and vein M_{3+4} separate apically; vein Cu_2 confluent with submarginal vein at a point much basad of vein m-cu; vein 1V branching from vein 2V near its base.

Fore wings: inner and outer apical cells short, broad, both failing to attain wing apex, contingent at their adjacent margins; third apical cell petiolate with its apex subtending a swollen outer portion of wing apex which usually appears somewhat falcate as a result.

Genital capsule: male plate gradually narrowed on outer margin beginning at point distad of middle its length, apex turned dorsad, with single discal macroseta on plate near base and with several poorly developed microsetae irregularly arranged; pygofer, in lateral aspect, without distinct group of isolated setae just dorsad of outer basal angle of plate, disc with numerous irregularly arranged microsetae and a row of these on posterior margin; pygofer

hooks wanting; anal hooks wanting; length of ninth sternum much less than half length of male plate.

Internal male genitalia: style, in broad aspect, smoothly curved posterolaterad towards apex, with blunt preapical angular protuberance on mesal margin, without setae; connective T-shaped or in the form of a trapezoid, the aedeagal articulation usually subterminal; *aedeagus with shaft very short and with large looped process on right side arising from atrium and greatly exceeding apex of shaft*, the apex of the process directed dorsad; preatrium wanting.

The leafhoppers placed here are fairly robust, with a triangular well-produced head. The head, including the eyes, is narrower than the pronotum, with the disc of the crown convex. The pronotum is short and slightly emarginate posteriorly. The face, in profile, is smoothly convex, with its contour divergent from the line of the dorsum. The pleural portion of the pronotum is broader than the ocellocular area. The species are variously marked with orange, black, and brown.

As far as is known, the genus is Sonoran in distribution.

In the list of species, those not studied are prefixed with an asterisk.

Eupterella acuminata DeLong and Ruppel, 1950a: 239

* *Eupterella bicolor* DeLong and Ruppel, 1950a: 242

Eupterella frigida DeLong and Ruppel, 1950a: 240

* *Eupterella gladia* DeLong and Ruppel, 1950a: 240

Eupterella huachucae (Lawson), 1930a: 135 (*Eupteryx*)

Eupterella mexicana DeLong and Ruppel, 1950a: 239

Genus *Eupteroidea*, nov.

(Pl. 30, fig. 80; pl. 31, fig. 81)

Type of the genus, *Typhlocyba stellulata* Burmeister.

Hind wings: as in genus *Eupterella*, but separation of the vannal veins occurring near their mid-length.

Fore wings: inner apical cell short, not attaining wing apex, nearly triangular; second apical cell sessile at base, very broad apically; third apical cell long-petiolate, its apex subtending an enlargement of the outer portion of the apical wing margin, the apex of the wing thus appearing falcate as in *Eupterella*; outer apical cell large, trapezoidal, not attaining wing apex, and not in contact with inner apical cell at its mesal margin.

Genital capsule: male plate, in ventral aspect, with longitudinal row of about five macrosetae near to and parallel to lateral margin over slightly more than basal half of length, lateral and mesal margins nearly parallel to just before apex where lateral margin

converges sharply and convexly towards mesal margin; in lateral aspect, plate slightly exceeding pygofer, with apex turned sharply dorsad and bearing few small setae, a very few microsetae over disc and few in row along lateral margin on apical half; pygofer, in lateral aspect with microsetae dispersed over disc and along base of posteroventral margin, without group of macrosetae near inner basal angle of male plate, posterior margin elongate, not inrolled, clothed with scalelike excrescences throughout its length and with row of setae dorsally, the scales extending down over ventrad-directed process; length of ninth sternum less than half length of plate.

Internal male genitalia: style very long, slender, tapering, gradually curved posterolaterad in basal two thirds, the apical third acicular and turned sharply laterad, *inner margin without preapical angular protuberance*, with few widely spaced alveoli near middle its length, *outer margin lacking setae and alveoli*; connective broadly T-shaped, the apex not turned dorsad, the aedeagal articulation terminal; aedeagus without preatrium, with well-developed dorsal apodeme, shaft flattened anteroposteriorly with paired preapical pointed processes extending slightly posterodorsad along shaft, each with extremely slender basal retrorse process, and extreme apex of shaft with pair of flattened flange-like processes extending posterolaterad.

In dorsal aspect, the head including the eyes is much narrower than the pronotum and somewhat produced medially, but with the apex rounded. The pronotum is much longer than the head, with lateral margins sharply divergent posteriorly, and the posterior margin scarcely emarginate. In profile, the contour of the face, below the antennae, is plane to slightly concave and divergent from the line of the dorsum. The pleural portion of the pronotum is very broad, several times the width of the ocellocular area. Female sternite VII is strongly produced and keeled medially.

Ribaut (1936b) has already called attention to the distinctness of this species. Included is only the type of the genus, a Palaearctic species with a limited Nearctic distribution.

Eupteroidea stellulata (Burmeister), 1841a: pl. 13 (*Typhlocyba*) (*vide* Oman)

Genus *Eurhadina* Haupt

(Pl. 31, fig. 82)

Eurhadina Haupt. Zool. Jahrb., Syst., vol. 58, p. 269. 1929.

Type of the genus, *Cicada pulchella* Fallén, by original designation.

Hind wings: as in genus *Eupteroidea*.

Fore wings: venation as in *Eupteroidea*, but inner apical vein somewhat variable in origin, usually occurring as continuation of vein M, but often arising more mesad along apex of cell M, and occasionally more laterad, at or near apex of cell R, the venation then approaching that of *Eupterella*; wing gradually narrowed on outer margin from expanded discal portion to conspicuously narrower smoothly rounded apex.

Genital capsule: capsule elongate, slender; male plate, in ventral aspect, with outer margin nearly straight, curved slightly postero-laterad apically, mesal margin gradually convergent towards outer margin apically, outer margin with broad, preapical triangular projection; in lateral aspect, plate exceeding apex of pygofer, with single discal macroseta on basal half, several close-set small setae at apex, and few small dispersed discal microsetae; pygofer, in lateral aspect, with posterior margin produced in rounded lobe, with row of small setae along posterodorsal margin and numerous microsetae on disc, without distinct group of setae just dorsad of outer basal angle of male plate; posterior margin not inrolled and differentially sclerotized; length of ninth sternum more than half length of male plate.

Internal male genitalia: style elongate, slender, curved gradually dorsad towards apex, without preapical angular protuberance, extreme apex slightly curved laterad, with row of widely spaced setae along dorsal margin; connective Y-shaped and with Y-shaped thickening, not curved dorsad apically, the aedeagal articulation terminal; aedeagus strongly recurved, preatrium wanting; shaft with two pairs of branched apical processes but none along length; dorsal apodeme well developed, in caudal aspect with an opening near its summit.

The leafhoppers included here appear robust, in dorsal aspect, as a result of the broadened discal portion of the fore wings. The head, including the eyes, is narrower than the pronotum, and is well produced medially, in dorsal aspect with the anterior margin broadly rounded. The pronotum is much longer than the head, with lateral margins divergent posteriorly and with the posterior margin scarcely emarginate. In profile, the line of the dorsum is gradually declivent anterior to the disc of the pronotum. The face is angulate, the contour of its lower portion nearly parallel to the line of the dorsum. The pleural portion of the pronotum is very much broader than the ocellocular area.

One species, the first of those listed below, has been taken in Massachusetts, but males from this locality appear to be rare in North American collections. A single male with genitalia corre-

sponding to Ribaut's figures of *concinna* had fore wings with a venation much similar to that of *Eupterella*. The second species listed below is known from a single specimen taken in Long Island. The specimen is in the United States National Museum collection.

Eurhadina concinna (Germar), 1831a: 12 (*Tettigonia*) (*fide* Oman)

Eurhadina Loewi (Then), 1886a: 54 (*Eupteryx*)

Genus *Eupteryx* Curtis

(Pl. 31, fig. 83; pl. 32, fig. 84)

Eupteryx Curtis. Ent. Mag., vol. 1, p. 192. 1833.

Type of the genus, *Cicada picta* Fabricius, 1803, which is a synonym of *Cicada atropunctata* Goeze, 1778 (original designation).

Hind wings: venation as in genus *Eupteroidea*.

Fore wings: inner and outer apical cells not attaining wing apex; second apical cell much broader at apex than at base; third apical cell petiolate; inner apical vein arising from cell R or M.

Genital capsule: male plate, in ventral aspect, broad basally, gradually narrowed on outer margin to rounded apex, chaetotaxy various, a single macroseta near inner basal angle of male plate or more distad on disc, a single oblique row of macrosetae, or an oblique double row; in lateral aspect, plate often with poorly-developed submarginal row of microsetae parallel to lateral margin; pygofer, in lateral aspect, well produced, *with discoid cluster of macrosetae just dorsad of outer basal angle of male plate* and with numerous microsetae irregularly scattered over posterior half of disc, *posterior margin rolled mesad and sclerotized heavily*, the inrolled margin often modified to form pygofer hook extending above upper pygofer margin, or not extending so far but sclerotized so as to appear as internal pygofer process; length of ninth sternum nearly half length of male plate.

Internal male genitalia: style elongate, curved smoothly laterad through most of its length, with preapical deltoid protuberance on mesal margin, with small setae extending laterad along outer margin and few alveoli along inner margin, both anterior to deltoid protuberance; connective much shorter than style, Y-shaped or triangular, its apex usually turned dorsad and the aedeagal articulation subterminal; *aedeagus typically with pair of apical processes, lacking atrial processes*; preatrium short or wanting.

The head, in dorsal aspect, is distinctly produced medially, and varies from nearly deltoid with the apex rounded, to smoothly curved on the anterior margin. The head is usually narrower than the pronotum. In lateral aspect, the contour of the face is smoothly

convex. The pleural portion of the pronotum is wider than the ocellocular area. The pronotum is longer than the head, with lateral margins divergent posteriorly and with posterior margin rectilinear or very shallowly emarginate.

As here restricted, the genus includes the *aurata*, *artemesiae*, *urticae*, *melissae*, and *vittata* groups of Ribaut, in addition to the North American *furcata* group which appears distinct from the Palaearctic species studied. The venation of the fore wing of the *melissae* group differs from that of the *vittata* group in that in the former the inner apical vein arises from cell R instead of from cell M. In the *furcata* group, the pygofer hook extends beyond the pygofer margin.

The distribution of the genus is problematical. It is at least Holarctic. The author does not know whether species from Queensland described by Kirkaldy, from India by Distant, and from Japan by Matsumura, are congeneric with this or with allied genera treated here.

In the list of species below, *vanduzeei* could not be placed, because no males were found among the rather large number of specimens examined. Perhaps males of this species do not occur. No males of *juvenis* were available for study.

Vittata group

Eupteryx artemesiae (Kirschbaum), 1868b: 190 (*Typhlocyba*) (*fide* Oman)

Furcata group

Eupteryx clavalis McAtee, 1919c: 185

Eupteryx flavoscuta Gillette, 1898a: 749

Eupteryx furcata (Beamer), 1943b: 133 (*Typhlocyba*), new combination

Eupteryx nigra Osborn, 1905c: 543

Melissae group

Eupteryx melissae Curtis, 1837d: 640 (*fide* Oman)

Species incertae sedis

Eupteryx juvenis McAtee, 1919c: 186

Eupteryx vanduzeei Gillette, 1898a: 748

Genus *Henribautia* Young and Christian, nov.

(Pl. 32, fig. 85)

Type of the genus, *Typhlocyba nigricephala* Beamer.

Hind wings: vein 1V branching from vein 2V near its midlength; submarginal vein absent at wing apex; posterior branch of R fused with apical portion of vein M_{1+2} ; otherwise as in genus *Eupterella*.

Fore wings: inner and outer apical cells short, not attaining wing apex; second apical cells much broader at apex than at base; third apical cell petiolate; wing apex somewhat oblique.

Genital capsule: male plate, in ventral aspect, broadened on basal half, abruptly narrowed near middle of length to narrow upturned apex; in lateral aspect with single macroseta near outer basal angle of male plate, and few small setae on apical half; pygofer, in lateral aspect, with large group of microsetae on ventral half of disc, *completely without macrosetae*, with posteroventral margin slightly expanded, without pygofer hooks, posterior margin not inrolled nor differentially sclerotized, posterodorsal margin with or without row of small setae; anal hooks wanting.

Internal male genitalia: style narrow, gradually tapered and curved laterad on apical half, with preapical triangular protuberance in inner margin, with one or few setae on outer and several alveoli on inner margin near middle of length; connective Y-shaped, the stem broad, with median dorsal keel extending distad over aedeagal articulating surface, the aedeagal articulation thus subterminal; aedeagus without preatrium, dorsal apodeme simple, well developed, shaft slender, elongate, with paired apical processes.

The head is well produced medially, and conical, the median length of the crown greatly exceeding the length next the eye. The head is nearly, or quite, as long as the pronotum. The pronotum is broader than the head, the lateral margins divergent posteriorly, the posterior margin scarcely emarginate. In lateral aspect, the crown is sharply rounded to the slightly convex face, the contour of which is divergent from the line of the dorsum. The pleural portion of the pronotum is much broader than the ocellocular area. Ocelli are present, situated on the margin between crown and face, and not near the compound eyes.

This genus is named in honor of Dr. Henri Ribaut, whose excellent work on the French fauna has served as a stimulus to other workers in the field.

Three species have been examined which belong to this genus, one species of which is undescribed. The known distribution is Sonoran.

Henribautia hubbardi (McAtee), 1924c: 35 (*Erythroneura*), new combination

Henribautia nigricephala (Beamer), 1943b: 132 (*Typhlocyba*), new combination

Genus *Ossiannilssonina* Young and Christian, nov.

(Pl. 33, fig. 86)

Type of the genus, *Typhlocyba berenice* McAtee.

Hind wings: as in genus *Henribautia*.

Fore wings: as in genus *Henribautia*, but with the apices smoothly rounded.

Genital capsule: male plate, in ventral aspect, gradually narrowed on outer margin towards apex, occasionally with small lobe on lateral margin before apex, never with oblique row of macrosetae, and *without a single macroseta near outer basal angle of male plate* (except in *sexnotata*) with microsetae irregularly arranged; pygofer, in lateral aspect, *with posterior margin distinct, not rounded to posteroventral margin*, rectilinear in form; pygofer wall frequently with sclerotized bars occurring within the limits of the pygofer proper, or prolonged posterodorsally or posteriorly as short pygofer hooks; a group of macrosetae usually present on pygofer just dorsad of outer basal angle of male plate, a row of small setae located posterodorsally, and a row of microsetae on disc extending dorsocaudad from the group of macrosetae; anal hooks wanting.

Internal male genitalia: style elongate, slender, gradually curved laterad or dorsolaterad apically, *without triangular preapical projection on inner margin* (present on outer margin in *flavomarginata*) with elongate slender setae on outer margin and almost always with few alveoli on inner margin; connective triangular or Y-shaped; aedeagus with preatrium distinct, aedeagal apodeme short, well developed or not, *shaft occurring as flattened membranous structure included between basal portions of a pair of forcipate atrial processes* which are branched or not.

In dorsal aspect, the head, including the eyes, is narrower than the pronotum, and only slightly produced medially to the rounded anterior margin, the median length of the crown not greatly exceeding the length next the eye. The pronotum is short, but much longer than the head, with lateral margins greatly divergent posteriorly, and with the posterior margin shallowly concave. In lateral aspect, the face is strongly convex to slightly below the antennal insertions, then slightly convex to the tip of the clypellus. The width of the pleural portion of the pronotum greatly exceeds the width of the ocellocular area. Ocelli are present or absent, when present, situated on the rounded margin between crown and face, and nearer the eyes than to each other. The species are usually pale in color, with dark markings before the bases of the apical cells, but with dark markings occasionally more extensive. The color markings are red in a few species.

This genus is related to the *cruenta* group of *Typhlocyba* of Ribaut (1936). It is also closely related to the *rosae* group of *Typhlocyba*. It is named in honor of Dr. Frej Ossiannilsson, of

Uppsala, Sweden, who has contributed much to our knowledge of the Homoptera.

A list of included species follows. The genitalia of the type of *clymene* were partly missing, and no conclusions could be drawn from their examination, but the species is placed here on the basis of McAtee's figures. The type of *eurydice* was in slightly better condition, but the membranous portion of the shaft of the aedeagus could not be seen. The type was the only male available for this study. The species prefixed with a single asterisk have not been studied. No male of *duplicata* was available at the time of this study.

Ossiannilssonina antigone (McAtee), 1926a: 35 (*Typhlocyba*), new combination
Ossiannilssonina appendiculata (Malloch), 1920a: 95 (*Typhlocyba*), new combination.

Ossiannilssonina berenice (McAtee), 1926a: 38 (*Typhlocyba*), new combination
Ossiannilssonina clymene (McAtee), 1926a: 36 (*Typhlocyba*), new combination
Ossiannilssonina danac (McAtee), 1926a: 37 (*Typhlocyba*), new combination
Ossiannilssonina duplicata (McAtee), 1926a: 16 (*Typhlocyba*), new combination
Ossiannilssonina eurydice (McAtee), 1926a: 37 (*Typhlocyba*), new combination
Ossiannilssonina flavomarginata (Gillette and Baker), 1895a: 111 (*Typhlocyba*), new combination

Ossiannilssonina hermione (McAtee), 1926a: 38 (*Typhlocyba*), new combination.

* Ossiannilssonina hinci (Knoll), 1944a: 272 (*Typhlocyba*), new combination
Ossiannilssonina nicarete (McAtee), 1926a: 36 (*Typhlocyba*), new combination
Ossiannilssonina phryne (McAtee), 1926a: 34 (*Typhlocyba*), new combination
Ossiannilssonina quadrata (DeLong and Johnson), 1936a: 102 (*Typhlocyba*), new combination

* Ossiannilssonina serrula (Ross and DeLong), 1949a: 118 (*Typhlocyba*), new combination

Ossiannilssonina sexnotata (Van Duzee), 1914a: 57 (*Empoa*), new combination
Ossiannilssonina troza (Ross and DeLong), 1949a: 117 (*Typhlocyba*), new combination

Ossiannilssonina tunicarubra (Gillette), 1898a: 752 (*Typhlocyba*), new combination

Genus *Ribautiana* Zakhvatkin¹

(Pl. 33, fig. 87)

Ribautiana Zakhvatkin. Rev. Ent. URSS, 1945 nos. 3-4, p. 112. 1947.

Type of the genus, *Cicada ulmi* Linnaeus, by original designation.

Hind wings: as in genus *Henribautia*.

Fore wings: as in genus *Henribautia*, but with the apices smoothly rounded.

Genital capsule: male plate, in ventral aspect, abruptly narrowed near middle its length, to narrow upturned divergent apex, with

1. See footnote 2, title page.

single macrosetae near outer basal angle, and two smaller setae near lateral margin near middle of plate; in lateral aspect with a number of scattered microsetae, some of them tending to form a submarginal row along lateral margin; pygofer, in lateral aspect, *with group of macrosetae just dorsad of outer basal angle of male plate*, and with numerous microsetae in region caudad and dorsad of these, posterior margin scarcely inrolled, not differentially sclerotized, posterior margin not well differentiated, merging with ventral margin; pygofer hooks wanting; anal hooks wanting.

Internal male genitalia: style elongate, slender, gradually tapering and curved laterad or dorsad towards apex, the *inner margin with preapical triangular protuberance*; outer margin with few long setae and inner margin with several alveoli; connective Y-shaped or triangular, the aedeagal articulation terminal or subterminal; aedeagus without preatrium, aedeagal apodeme well developed, simple, *atrial processes or basal shaft processes present*, and one or more pairs of processes more distad on the elongate shaft.

The head, in dorsal aspect, is narrower than the pronotum, and scarcely produced, its median length not greatly exceeding the length next the eye. The anterior margin of the crown is smoothly rounded. The pronotum is short, with lateral margins greatly divergent posteriorly, and with the posterior margin shallowly emarginate. In profile, the contour of the face is convex and divergent from the line of the dorsum. The width of the pleural portion of the pronotum greatly exceeds the width of the ocellocular area. Ocelli are absent. All of the species have dark markings at the apices of the veins which form the distal margins of the inner and outer apical cells of the fore wings.

The genus has a Holarctic distribution. The following Nearctic species are included. Those species prefixed with an asterisk had not been studied at the time of writing. No Nearctic specimens of *tenerrima* have been seen.

- Ribautiana foliosa (Knull), 1945a: 104 (*Typhlocyba*), new combination
Ribautiana luculla (Medler), 1942a: 139 (*Typhlocyba*), new combination
* Ribautiana piscator (McAttee), 1926a: 7 (*Typhlocyba*), new combination
* Ribautiana sciotoensis (Knull), 1945a: 103 (*Typhlocyba*), new combination
Ribautiana surda (DeLong and Johnson), 1936a: 101 (*Typhlocyba*), new combination
Ribautiana tenerrima (Herrich-Schaeffer), 1834b: No. 10a (*fide* Oman)
Ribautiana ulmi (Linnaeus), 1758a: 439 (*Cicada*)
Ribautiana unca (McAttee), 1926a: 8 (*Typhlocyba*), new combination

Genus *Typhlocyba* Germar¹

(Pl. 33, fig. 88; pl. 34, fig. 89)

- Typhlocyba* Germar. In Silbermann's Rev. Ent. vol. 1, p. 180. 1833.
Empoa Fitch. Ann. Rep. New York St. Cab. Nat. Hist., p. 63. 1851 (type, *Empoa querci* Fitch, 1851, by subsequent designation of Van Duzee (Check List Hemip., p. 77. 1916)).
Anomia Fieber. Verh. zool.-bot. Ges. Wien, vol. 16, p. 509. 1866 (type, *Cicada quercus* Fabricius, 1794, by subsequent designation of Evans (Trans. Roy. Ent. Soc. London, vol. 98, p. 200. 1947)).
Edwardsiana Zakhvatkin. Rev. Russe d'Ent., vol. 23, p. 262. 1929 (type, *Cicada rosae* Linnacus, by original designation).

Type of the genus, *Cicada quercus* Fabricius, by subsequent designation of Woodworth, 1889.

Hind wings: as in genus *Henribautia*.

Fore wings: as in genus *Henribautia*, but with apices smoothly rounded.

Genital capsule: male plate gradually curved dorsad apically, with single macroseta near outer basal angle, and submarginal row of microsetae parallel to lateral margin near middle of its length, occasionally extending over apical half of length, with few other irregularly arranged microsetae; pygofer, in lateral aspect, of various forms, with or without sclerotized barlike thickenings which when present may or may not be extended as posterior or posterodorsal pygofer processes, with posteroventral margin occasionally inrolled, often with group of macrosetae just dorsad of outer basal angle of male plate, almost always with group of small submarginal setae along posterodorsal margin and with numerous microsetae arranged over disc.

Internal male genitalia: style elongate, slender, usually either smoothly curved laterad or dorsad apically, or with apex abruptly curved laterad and appearing setiform in dorsal aspect (style sinuous in *aureotecta* and *rubriocellata*), with mesal preapical protuberance poorly developed or absent in broad aspect (which may be dorsal or caudal); style with setae in various arrangements; connective massive, the aedeagal articulation subterminal; aedeagus with preatrium well developed or not, apodeme usually well-developed, shaft varied; with paired ventral processes arising from atrium or base of shaft, or with two pairs of apical processes (one pair in *tortosa*, *niobe* and *lancifer*), and occasionally with dorsal processes along length of shaft.

The species, for the most part, are slender and delicate in appearance. In dorsal aspect, the head is narrower than the pronotum, and longer medially than next the eye. The anterior

1. See footnote 2, title page.

margin of the crown is broadly rounded. The pronotum is short and broad, with the lateral margins strongly divergent posteriorly and the posterior margin smoothly, shallowly concave. In profile, the contour of the face is smoothly convex (except in *querci* and some related species, where the clypellus is often conspicuously gibbous), and divergent from the line of the dorsum. The pleural portion of the pronotum is much broader than the ocellocular area. The color is usually pale white or yellow, occasionally with darker markings.

In genital structure, the group is heterogeneous, but although groups of species occur with similar genital structure, other species usually occur with an intermediate pattern, so that the array appears too nearly continuous for further subdivision, even though the magnitude of difference between some of the groups is of the same order as that used, in this treatment, as a basis for segregating species groups, as genera, from this one.

In the list of species which follows, those species not studied at the time of writing are prefixed with an asterisk. There has been some confusion concerning the status of *querci* Fitch. It seems probable that Fitch had a mixed population in mind at the time he wrote the original description, which might have led him to append to the original description, the phrase, "sometimes excessively numerous" (on oaks). We know, now, that several species occur on oak. Gillette (1898a) retained the name *querci* Fitch and referred to *bifasciata* Gillette and Baker as a variety of Fitch's species. McAtee (1926a) listed *bifasciata* Gillette and Baker in synonymy under *gillettei* Van Duzee, and further indicated in his discussion of the nomenclature of the species, that he considered *gillettei* Van Duzee, in a sense, as a substitute name for *querci* Fitch. The writers are of the opinion, then, that the identity of *querci* Fitch already has been fixed, and that since McAtee's rejection of Fitch's name was invalid, then one of the varieties of McAtee's *gillettei* must be chosen as the typical variety of *querci* Fitch. Variety *fitchii* McAtee has been chosen because it is appropriate from the standpoint of fitting the original description, of occurring on oak (although not known to be "excessively numerous"), and of occurring in New York.

Typhlocyba andromache McAtee, 1926a: 32

Typhlocyba ariadne McAtee, 1926a: 14

° Typhlocyba ariste McAtee, 1926a: 13

Typhlocyba arsinoe McAtee, 1926a: 31

° Typhlocyba athene McAtee, 1926a: 31

Typhlocyba aurotecta (Sanders and DeLong), 1917a: 93 (*Empoa*)

- Typhlocyba cassiopeia* Knull, 1944a: 269
Typhlocyba commissuralis Stål, 1858c: 196 (*fide* Oman)
Typhlocyba crassa DeLong and Johnson, 1936a: 102
Typhlocyba cymba McAtee, 1918b: 360
 * *Typhlocyba dorsti* Ossiannilsson, 1936a: 10
 * *Typhlocyba enascora* DeLong and Johnson, 1936a: 103
Typhlocyba euphrante McAtee, 1926a: 12
Typhlocyba expanda DeLong and Johnson, 1936a: 104
Typhlocyba froggatti Baker, 1925b: 537
Typhlocyba hockingensis Knull, 1944a: 270
Typhlocyba lancifer McAtee, 1926a: 19
Typhlocyba melite McAtee, 1926a: 32
Typhlocyba modesta Gibson, 1917a: 184
 * *Typhlocyba oneka* Knull, 1944a: 270
Typhlocyba pomaria McAtee, 1926a: 29
Typhlocyba prunicola Edwards, 1914a: 168
Typhlocyba putmani Knull 1944a: 269
Typhlocyba querci (Fitch), 1851a: 63 (*Empoa*)
 var. *querci* (Fitch), 1851a: 63 (*Empoa*)
 gillettei var. *fitchii* McAtee, 1926a: 25, new synonymy
 var. *sincera* McAtee, 1926a: 25
 var. *apicata* McAtee, 1926a: 25
 var. *saffrana* McAtee, 1926a: 26
 var. *russeola* McAtee, 1926a: 26
 var. *casta* McAtee, 1926a: 26
 var. *gillettei* Van Duzee, 1916a: 77
 var. *volans* McAtee, 1926a: 28
 var. *scripta* McAtee, 1926a: 28
 var. *venusta* McAtee, 1926a: 29
 var. *sellata* McAtee, 1926a: 29
 var. *vestita* McAtee, 1926a: 29
Typhlocyba quercus (Fabricius), 1794a: 47 (*Cicada*)
Typhlocyba rosae (Linnaeus), 1758a: 439
Typhlocyba rubriocellata Malloch, 1920b: 48
Typhlocyba shawneecana Knull, 1944a: 270
 * *Typhlocyba sollisa* Ross and DeLong, 1949a: 116
Typhlocyba spinosa Beamer, 1943b: 131
Typhlocyba surcula DeLong and Johnson, 1936a: 103
Typhlocyba tortosa Ross and DeLong, 1949a: 115

Genus *Eualebra* Baker

(Pl. 34, fig. 90)

Eualebra Baker. Psyche vol. 8, p. 402. 1899.

Type of the genus, *Eualebra smithii* Baker, by original designation.

Hind wings: vein IV branching from vein 2V basad of its mid-point; submarginal vein present, extending around wing apex and confluent with apex of posterior branch of R; posterior branch of

vein R not fused with apical portion of vein M_{1+2} ; apical portion of vein Cu_1 not fused with apical portion of vein M_{3+4} (vein Cu_1 appears branched apically); vein Cu_2 confluent with submarginal vein at point nearly opposite vein m-cu.

Fore wings: wing broad, short; inner and outer apical cells not attaining wing apex; all apical cells sessile; second and third apical cells much broader at apex than at base; preapical (greatest) widths of cells R and M subequal.

Genital capsule: plates short, but greatly exceeding short pygofer; plate, in ventral aspect, broad, nearly parallel-margined to apex which is very bluntly angulate in macerated specimens, with numerous macrosetae on disc laterally; pygofer, in lateral aspect, without setae; posterior margin smoothly convex; pygofer arising internally on pygofer wall, extending mesad short distance, then curved sharply anteroventrad then gradually dorsad and mesad, the apical half bisinuate.

Internal male genitalia: style slender, short, slightly curved mesad, gradually tapered to acute apex, with few alveoli on apical half, and one or several minute setae; connective U-shaped, each arm giving off a dorsal projection; aedeagus short, simple, laterally compressed; preatrium and dorsal apodeme short but distinct.

In form, these insects are broad and flat. The head is well produced medially, the median length nearly equal to the width between the eyes, and only slightly less than the median length of the pronotum. The width of the head, including the eyes, is less than the width of the pronotum. The margin of the crown, in dorsal aspect, extends straight anteriorly a short distance before each eye, the apex broadly paraboloid. The pronotum is short and broad, the lateral margins divergent posteriorly, the posterior margin rectilinear. In lateral aspect, the face and crown are depressed, the contour of the face nearly parallel to the line of the dorsum. The pleural portion of the pronotum is much broader than the ocellular area.

The species are white or yellowish marked with dark, red, or orange. The veins at the apex of the fore wings are pink.

Eualebra reticulata (Osborn), 1928a: 279 [*Dikraneura* (*Hyloidea*)], new combination

Eualebra smithii Baker, 1899b: 402

The holotype of *Eualebra notata* Baker, a female, from the Pomona College collection, has been examined and provided with a type label. The wing apices are damaged. The specimen has fused vannal veins, and probably should be placed in the *Dikraneurini*.

Genus *Joruma* McAtee

Joruma McAtee. Florida Ent., vol. 8, p. 34. 1924.

Joruma (*Jorumella*) McAtee, Proc. Zool. Soc. London, 1934, p. 113 (type, *Joruma ascripta* McAtee, by original designation).

Type of the genus, *Joruma pisca* McAtee, by original designation.

Hind wings: vannal veins separate apically; submarginal vein extending around wing apex to apex of vein M_{1+2} with which it is confluent; posterior branch of R occurring as short spur, not confluent with apical portion of vein M_{1+2} ; vein Cu_1 confluent with apical portion of vein M_{3+4} (vein Cu_1 appears unbranched apically); vein Cu_2 confluent with submarginal vein in basal half of wing.

Fore wings: inner apical cell broad and angulate at base, the pointed apex not attaining the wing apex; second and third apical cells sessile, narrower at base than at apex and gradually widened apically, the combined apices subtending the wing apex; second apical cell slightly longer than third; outer apical cell nearly always open basally.

Genital capsule: male plate elongate, exceeding apex of pygofer, with uniseriate macrosetae present; pygofer nearly always without setae arranged in groups; pygofer hooks nearly always wanting; anal hooks present.

Internal male genitalia: style elongate, slender; connective triangular or Y-shaped; aedeagus with or without processes, preatrium present or absent.

Joruma subgenus *Joruma* McAtee

(Pl. 35, fig. 91)

Joruma McAtee. Florida Ent., vol. 8, p. 34. 1924.

Joruma (*Jorumella*) McAtee. Proc. Zool. Soc. London 1934, p. 113 (type, *Joruma ascripta* McAtee, by original designation).

Type of the subgenus, *Joruma pisca* McAtee, by original designation.

Wings: as in generic description.

Genital capsule: male plate, in lateral aspect usually very long and slender, greatly exceeding apex of pygofer, with uniseriate macrosetae extending nearly throughout length of plate or occurring in much shorter row, microsetae usually present and variously arranged; pygofer with posterodorsal margin somewhat produced, without distinct posterior margin, this merging with ventral margin; pygofer usually without groups of setae on disc (exceptions: *proxima* and *ascripta*) usually with very few microsetae irregular in position; pygofer hooks wanting except in a single undescribed species; anal hooks well developed and variable in form between

species, occasionally very long, extending ventrad then mesad, their apices crossing.

Internal male genitalia: style, in dorsal aspect, slender, expanded slightly on outer margin from opening of lumen to portion just basad of apex, apex slender, gradually tapered, with few minute denticles on dorsal face, outer margin with one or two setae just before narrowed apical portion, apex greatly exceeding apex of connective; connective a solid plate, broadly triangular, or Y-shaped, with apical notch bearing base of aedeagus; aedeagus usually with preatrium elongate (exception: *proxima*), with various processes on atrium or shaft, dorsal apodeme not well differentiated.

The head is well produced. In dorsal aspect, the median length of the crown usually exceeds the width between the eyes, and is nearly equal to the median length of the pronotum. The pronotum is short, its width greatly exceeding its length, with lateral margins divergent posteriorly and posterior margin shallowly concave. In lateral aspect, the contour of the face is convex, and strongly divergent from the line of the dorsum. The pleural portion of the pronotum is narrow, but broader than the ocellocular area. The crown in lateral aspect is often slightly concave. Ocelli are present.

Although the venation of the hind wings of *ascripta* and *neascripta* is distinct from the more typical members of the genus, little can be found to support the separation of these as a separate genus.

The known distribution is primarily Neotropical, with two species known from the Nearctic region.

In the list of species which follows, those species of which only female specimens have been seen by the writer are prefixed with a single asterisk, while those which have not been seen at all are prefixed with a double asterisk.

Joruma albifrons McAtee, 1926b: 166

Joruma ascripta McAtee, 1926b: 167

***Joruma atratula* McAtee, 1926b: 170

**Joruma aurata* McAtee, 1926b: 168

**Joruma cingulata* McAtee, 1926b: 167

**Joruma coccinea* McAtee, 1926b: 166

**Joruma ebria* McAtee, 1926b: 169

Joruma feminea McAtee, 1926b: 169

***Joruma fumosa* Osborn, 1928a: 283

Joruma fuscoclavata Osborn, 1928a: 281

Joruma neascripta Oman, 1937d: 568

**Joruma nigricans* Osborn, 1928a: 281

***Joruma peltata* McAtee, 1926b: 168

Joruma pisca McAtee, 1924c: 34

Joruma proxima McAtee, 1926b: 168

***Joruma semenula* McAtee, 1926b: 169

***Joruma subaurata* McAtee, 1926b: 168

Joruma subgenus *Jorumidia*, nov.

(Pl. 35, fig. 92)

Type of the subgenus, *Joruma curvata* Osborn.

Wings: as in generic description.

Genital capsule: male plate, in ventral aspect, broad at base, narrowed at basal third on outer margin, then slender to apex, with row of few macrosetae in region of narrowing of plate; plate, in lateral aspect, considerably exceeding apex of pygofer and usually with few microsetae in irregular row along later margin on posterior half, and few longer microsetae at apex; pygofer with few or without microsetae, without macrosetae; pygofer hooks wanting; anal hooks well developed.

Internal male genitalia: style slender, gradually tapered to truncate apex, in dorsal aspect with dorsal surface provided with transverse rugae; *lateral margin with conspicuous spur directed laterad*; connective Y-shaped, the apex with a median dorsal keel overhanging aedeagal articulation; aedeagus with or without preatrium and without processes, dorsal apodeme well developed, simple, shaft gradually curved dorsad.

The species are similar to typical *Joruma* in appearance.

The known distribution is Neotropical and Sonoran.

Joruma curvata Osborn, 1928a: 284

Joruma minuta Lawson, 1930a: 136

Genus *Neojoruma*, nov.

(Pl. 36, fig. 93)

Type of the genus, *Joruma adusta* McAtee.

Wings: as in genus *Joruma*, but with base of outer apical cell of fore wing distinct.

Genital capsule: male plate, in lateral aspect, very long, very greatly exceeding apex of pygofer, its lateral margin sinuous throughout its length, with discal row of macrosetae over middle third, a dense tuft of very fine long setae extending dorsad near base and numerous irregularly arranged microsetae on disc near base and near apex of plate; pygofer with posterodorsal margin produced, posterior margin short, disc without setae, with single small seta near posteroventral pygofer margin in its upper half; pygofer hooks wanting; anal processes broad, flat.

Internal male genitalia: style short, thick, its apex massive and extending mesad at right angles to long axis, its extreme tip obliquely truncate, somewhat concave; connective Y-shaped, its apex greatly

exceeding apices of styles; aedeagus enormous, preatrium distinct, *atrial rim heavily sclerotized and giving off a pair of posteriorly directed forcipate processes dorsally and a decurved short apodeme on each side*, shaft laterally compressed, with apical median ventral keel and an apical dorsal process shallowly bifurcate at tip.

The head, in dorsal aspect, is short and broadly rounded anteriorly, with anterior and posterior margins subparallel. The median length of the crown is approximately equal to the length next the eye. The width of the head, including the eyes, is much less than the width of the pronotum. The pronotum is short and broad with lateral margins scarcely developed, and with posterior margin straight, not emarginate. In lateral aspect, the contour of the face is convex, and strongly divergent from the line of the dorsum. The pleural portion of the pronotum is narrow, scarcely wider than the ocellocular area.

Only the type of the genus, a Brazilian species, is known.
Neojoruma adusta (McAtee), 1924c: 35 (*Joruma*), new combination

Genus *Paulomanus*, nov.

(Pl. 36, fig. 94; pl. 37, fig. 95)

Type of the genus, *Paulomanus cecropiae*, n. sp.

Hind wings: vein 1V separating from vein 2V near its base; submarginal vein extending around wing apex and confluent with apex of vein "R + M"; apical portion of Cu_1 fused with apical portion of vein M_{3+4} (vein Cu_1 appears unbranched apically); free portion of vein M_{3+4} occurring near midlength of wing; Cu_2 confluent with submarginal vein in basal half of wing, a pronounced sinus occurring at the point of confluence; wing apex truncate.

Fore wings: inner and outer apical cells elongate, neither attaining wing apex; inner and third apical cells subequal in length; outer apical cell open basally; apical width of cell M greatly exceeding apical width of cell R; cell M extending more distad than cell R.

Genital capsule: male plate expanded dorsad near middle of its length, with smaller lateral lobe beneath expanded portion, the smaller lobe close-set with microsetae, a small group of microsetae ventrad of lateral lobe and another similar group on lateral margin near base and a few small subapical setae on disc; pygofer with distinct posterodorsal lobe, lacking setae except few submarginal microsetae near base of anal tube; pygofer hooks arising from ventral margin of pygofer, extending posterodorsad, slender, cylindrical, tapering to acute tips; anal hooks wanting.

Internal male genitalia: style without preapical lobe or apical extension, apex of outer margin extended laterad, in broad aspect, inner margin forming mesal blunt protuberance, then extended laterad forming a distinct sinuous posterior margin which converges gradually to the outer margin; outer margin with few ciliate preapical hairs; connective Y-shaped, the apex turned dorsad, the aedeagal articulation subterminal; aedeagus with preatrium short, distinct, dorsal apodeme large, with anterior and posterior lobes, flattened laterally; shaft dorsoventrally flattened, keeled laterally, with four retrorse dorsally-arising processes near apex, these extending basad about one third length of shaft, apex of shaft truncate.

This genus is named in honor of Dr. Paul W. Oman, of the Division of Insect Identification of the United States Department of Agriculture, who was partly responsible for the choice of the subject of this research, and who has co-operated during its progress through numerous helpful suggestions.

Paulomanus cecropiae, n. sp.

Form. Head not greatly produced before eyes, width between eyes less than one-third greater than median length of crown; disc of crown flattened to concave in lateral aspect; width of head, including eyes, exceeding greatest width of pronotum; line of crown forming nearly a right angle with line of face in profile; face broadly convex. Pronotum about one third longer than median length of crown, subequal in length to scutellum; lateral margins slightly convex and convergent posteriorly; posterior margin nearly transverse. Wings, genitalia, and genital capsule as in generic description.

Color. Male. Ground color of crown ivory, with an arcuate transverse burnished orange stripe between the eyes; pronotum sooty black with median longitudinal area of variable width burnished orange to yellow; fore wings opaquely mottled with burnished orange except sooty black costal plaque, a darker spot just posterior to plaque and pair of paler spots in clavus, one near anal angle of wing and one at level of midpoint of clavus, apical third abruptly hyaline, the veins and margin pale yellow except along the fuscous radial edge; face with ivory transverse area between eyes covering basal third, apical two thirds sooty black except apex of clypellus and genae, yellowish, and a red spot above each antennal base; venter fuscous except paler coxo-femoral joints of hind legs, the pale male plates except their outer basal angles,

and the pale legs except for the dark femoral bases, the tarsal claws, and a vague dark area on the hind tibiae. Occasionally males are less well marked and generally of a paler hue, with pale areas more extensive on the pronotum and fore wings.

Female. Entire dorsum yellowish to white, an arcuate transverse line between eyes on crown, an indefinite transverse area on anterior disc of pronotum, a basal, a middle and an apical spot in each clavus, three similarly located spots in each corium along the claval suture, a small spot near base of costal plaque, a large spot at base of inner apical cells which occasionally becomes a transverse blotch extending across base of all apical cells, yellow; face and venter entirely straw-yellow except dark tarsal apices.

Described from a series of twenty-five specimens from Summit, Panama Canal Zone, taken on *Cecropia* (plant host) by N. L. H. Krauss, August 27, 1946 except one female paratype taken in September of the same year. Holotype male, allotype female, seven paratype males and five paratype females in U. S. N. M. collection; six paratype males and five paratype females in the Snow Entomological Collection at Kansas University.

Genus *Beamerana*, nov.

(Pl. 37, fig. 96)

Type of the genus, *Erythroneura tropicalis* Osborn.

Hind wings: vein 1V branching from vein 2V near its base; submarginal vein present, extending around wing apex and confluent with apex of vein "R + M"; vein Cu_1 fused with apical portion of vein M_{3+4} (vein Cu_1 appears unbranched apically); vein Cu_2 confluent with submarginal vein near midlength of wing.

Fore wings: inner apical cell elongate, parallel-sided, its angulate base more proximad than bases of second and third apical cells, its apex attaining wing apex; second and third apical cells elongate, parallel-sided, sessile basally, their bases forming a continuous transverse line; outer apical cell elongate, open basally, not attaining wing apex.

Genital capsule: male plate without a distinct group of macrosetae, with a group of microsetae on basal portion of distal half (concealed by pygofer hook in drawing); pygofer in lateral aspect with posterior margin declivous, lacking conspicuous posterodorsal lobe, with posterior margin broadly thickened to form heavily sclerotized V-shaped bar with apex thickened in transverse plane and bilobed; ventral margin of pygofer overhanging and concealing all but ex-

treme apex of plate in lateral aspect; surface of pygofer lacking setae.

Internal male genitalia: style elongate, slender, without preapical lobe or apical extension, apical portion smoothly curved dorsolaterad and tapered to point, with few macrosetae irregularly arranged on narrowed curved apex and pair of lateral preapical macrosetae; connective triangular with margins concave, with central Y-shaped thickened portion; aedeagal articulation subterminal; aedeagus greatly elongate, narrow, tapering to acute apex, highly ornamented; a lateral cusp each side near base of dorsal apodeme, its apex directed posterodorsad, a number of setiform excrescences beginning ventrally on shaft just distad of cusps, extending dorsad then ventrad in sinuous curve along length of shaft, ending subapically, extreme apex completely, and dorsal portion of apical two thirds, adorned with ornamentations similar in appearance to fish-scales, a few smaller scalelike markings on lateroventral portion of shaft before midpoint; aedeagal apodeme well developed; genital atrium near aedeagal articulation with connective, the preatrium thus very short; gonopore subapical; anal hooks slender, heavily sclerotized, extending ventrad, not intimately associated with pygofer wall.

The genus is known only from the type of the genus, a Bolivian species. It is a slender leafhopper with the eyes large and the head well produced medially. The median length of the crown greatly exceeds the distance between the eyes. The disc of the crown is distinctly depressed. The median length of the head is approximately equal to the median length of the pronotum. The lateral margins of the pronotum, in dorsal aspect, are very short, the posterior margin shallowly emarginate. In lateral aspect, the crown is sharply rounded to the face which is convex and divergent from the line of the dorsum. The width of the pleural portion of the pronotum is greater than the width of the ocellocular area.

The wings were described and illustrated from the holotype of *Erythroneura similis* Osborn, which is a synonym of the genotype. Intact wings were not found on the holotype or the single paratype of the type species.

To Professor R. H. Beamer, of Kansas University, who has devoted the better part of a lifetime to making contributions and assisting others to make contributions to our knowledge of the Homoptera, this genus is enthusiastically dedicated.

Beamerana tropicalis (Osborn), 1928a: 288 (*Erythroneura*), new combination
similis (Osborn), 1928a: 289 (*Erythroneura*), new synonymy

Genus *Empoasca* Walsh

(Pl. 38, fig. 97)

Empoasca Walsh. *Prairie Farmer*, vol. 10 no. 10, p. 149. 1862.*Chloria* Fieber (*nec* Schiner 1862). *Verh. zool.-bot. Ges. Wien*, vol. 16, p. 508. 1866.*Kybos* Fieber. *Verh. zool.-bot. Ges. Wien*, vol. 16, p. 508. 1866.*Chlorita* Fieber. *Kat. Eur. Cic.*, p. 14, 1872 (new name for *Chloria* Fieber *nec* Schiner).*Cybus* Douglas. *Ent. Mo. Mag.*, vol. 12, p. 26. 1875.*Hebata* LeDong. *U. S. Dept. Agr. Tech. Bull.* 231: 32. 1931.

Type of the genus, *Empoasca viridescens* Walsh, 1862, which is a synonym of *Tettigonia fabae* Harris, 1841.

Hind wings: vannal veins separate apically; submarginal vein extending around wing apex to apex of vein "R + M" and confluent with this vein; apex of vein Cu_1 confluent with apical portion of vein M_{3+4} (vein Cu_1 appears unbranched apically); vein Cu_2 confluent with submarginal vein in basal half of wing.

Fore wings: venation quite variable interspecifically and intraspecifically, often somewhat variable between two wings of same specimen; inner and outer apical cells not attaining wing apex; second and third apical cells sessile, or triangular, or even short stalked.

Genital capsule: male plate usually well provided with macrosetae in various arrangements but seldom uniseriate, frequently with numerous microsetae in addition, these occasionally very elongate, thin and delicate, plate often with peglike setae in addition, these usually occurring near base of plate; pygofer usually without macrosetae, with microsetae variously arranged; pygofer hooks arising from anteroventral pygofer wall, varied in length and form, seldom wanting; anal hooks present and of various forms.

Internal male genitalia: style without preapical lobe or apical extension, usually elongate, slender, gradually tapering and curved posterolaterad, usually provided with setae along length, apical portion serrate on mesal margin in most of described species, extreme apex usually truncate or concave when observed at very high magnifications; connective typically papilionaceous in form; aedeagus with preatrium elongate, shaft usually very short, occasionally with preatrial paired processes or processes from base of shaft.

The head, in dorsal aspect, varies from blunt and parallel-margined to well produced medially. In lateral aspect, the line of the face is always divergent from the line of the dorsum. The species are usually some shade of yellow or green, occasionally marked with red or chalky white, and occasionally mottled on the dorsum. The writer is indebted to Mr. Paul Christian for the observation that in

the paler species of *Empoasca*—those which may easily be confused with other typhlocybine genera in gross examination—the species of *Empoasca* almost invariably have some green color on the legs, whereas other genera do not, a feature which permits ready recognition in the field.

The genus is a large and difficult one, from a taxonomic standpoint. Approximately one-hundred twenty-five species have been carefully studied in the course of this work. In spite of this, the writer is unwilling to attempt to establish subgenera at this time, for the genus is cosmopolitan and the degree of intergradation between species groups can only be conjectured. It seems apparent that many more species remain to be described from the Western Hemisphere than have been described to date.

Empoasca represents a highly specialized group of Typhlocybinae, considered from a morphological, and from a biological standpoint. The highly specialized genital structures are almost unique. Reduction in venation of the hind wing has attained a degree surpassed only by *Idona* and *Typhlocybella* in the Dikraneurini. Host plant specialization is quite common and many of the mosts are herbaceous.

DeLong (1931b) erected *Hebata* and *Idona* as subgenera in addition to the typical subgenus, and recognized subgenus *Kybos* Fieber. *Idona* has been placed in the Dikraneurini in the present treatment. The head-shape characters used for the subgenera by DeLong are not very useful criteria. Careful study, at very high magnification, has revealed a slight difference in the shape of the extreme style apex between the subgenotypes of *Empoasca* and *Hebata*, and most of the Nearctic forms examined revealed little in the way of intergrades. But supporting characters could not be found, and in the absence of any evidence that the differences in style apices separate natural groups, and also in view of the torturous technique involved in getting the style apex perfectly oriented, there seems no reason for not abandoning *Hebata* as a synonym, as Dr. DeLong and his coworkers seem to have concluded since the establishment of *Hebata*, for this subgenus was not considered in their subsequent work.

The *smaragdula* group of species, as far as is known, stands well apart from other groups, and may well form a subgenus (*Kybos*) in a later analysis. The species in this group have styles which bear conspicuous long fine hairs, usually quite numerous, and the apical portion of the style curves gradually laterad. At least one of the

apical veins of the fore wing arises from cell R. The species are large.

The *confusa* group also consists of large species. The styles are straight, not curved laterally at their apices, and do not bear numerous long fine hairs. All of the apical veins of the fore wing arise from cell M.

Ribaut (1936b) has shown that an European group including *Cicadula viridula* Fallen is distinct, and Zakhvatkin (1946a) has treated this group as a separate genus.

In the following list of species, those not studied by the writer have been prefixed with an asterisk. Certain species which have been available for study nevertheless do not fit into any of the recognized groups. These species are listed, among those not studied by the writer, in a group of species of uncertain position.

Fabae group

- Empoasca abrupta DeLong, 1931b: 48
- Empoasca acuminata Wheeler, 1939a: 295
- Empoasca alboneura Gillette, 1898a: 743
- Empoasca amara Davidson and DeLong, 1939a: 114
- Empoasca ancistra Davidson and DeLong, 1939a: 115
- Empoasca arator Davidson and DeLong, 1940a: 610
- Empoasca arida DeLong, 1931b: 49
- Empoasca arta DeLong and Davidson, 1935a: 32
- Empoasca aspersa Gillette and Baker, 1895a: 107
- Empoasca biarca Davidson and DeLong, 1938a: 92
- Empoasca bicuspidata Davidson and DeLong, 1938a: 91
- Empoasca bidens DeLong, 1932c: 397
- Empoasca bifurcata DeLong, 1931b: 40
- Empoasca calcara DeLong, 1932c: 398
- Empoasca calcea DeLong, 1932c: 395
- Empoasca calyx Oman and Wheeler, 1938a: 140
- Empoasca caverna Davidson and DeLong, 1938a: 93
- Empoasca cerea DeLong, 1931b: 46
- Empoasca chelata DeLong and Davidson, 1936a: 226
- Empoasca coccinea (Fitch), 1851a: 63 (*Empoa*) (*fide* Oman)
- Empoasca convergens DeLong and Davidson, 1935a: 30
- Empoasca crepidula Wheeler, 1939a: 294
- Empoasca curvata Poos, 1933a: 177
- Empoasca curvatura Davidson and DeLong, 1938a: 90
- Empoasca decora DeLong and Davidson, 1935a: 33
- Empoasca decurvata Davidson and DeLong, 1938a: 93
- Empoasca delongi Poos, 1933a: 175
- Empoasca delta Wheeler, 1939a: 299
- Empoasca deluda DeLong, 1931b: 46
- Empoasca denaria Van Duzee, 1930a: 148
- Empoasca dentata DeLong and Davidson, 1935a: 30
- Empoasca dilitara DeLong and Davidson, 1935a: 36

- Empoasca ditata DeLong and Caldwell, 1934a: 606
 Empoasca diverta DeLong and Davidson, 1935a: 31
 Empoasca dorotheae Davidson and DeLong, 1939a: 111
 Empoasca elongata DeLong, 1931b: 53
 Empoasca erigeron DeLong, 1931b: 48
 Empoasca erythrocephala Wheeler, 1939a: 295
 Empoasca fabae (Harris), 1841a: 186 (*Tettigonia*) (*fide* Van Duzee)
 Empoasca fabalis DeLong, 1930a: 92
 batatae Poos, 1933a: 176
 Empoasca filimenta DeLong, 1931b: 43
 Empoasca galluxa Davidson and DeLong, 1939a: 117
 Empoasca gampoia Davidson and DeLong, 1939a: 118
 Empoasca kaibaba Davidson and DeLong, 1939a: 115
 Empoasca manda Davidson and DeLong, 1939a: 111
 Empoasca mexicana Gillette, 1898a: 737
 Empoasca neaspersa Oman and Wheeler, 1938a: 138
 Empoasca nigra Gillette and Baker, 1895a: 108
 Empoasca ocala Davidson and DeLong, 1939a: 114
 Empoasca occidentalis DeLong and Davidson, 1935a: 32
 Empoasca ocula (Osborn), 1928a: 268 (*Dikraneura*), new combination
 Empoasca panda DeLong, 1931b: 51
 Empoasca pergrada Davidson and DeLong, 1938a: 93
 Empoasca perlonga Davidson and DeLong, 1938a: 92
 Empoasca plebeia DeLong and Davidson, 1935a: 34
 Empoasca ponderosa DeLong and Davidson, 1935a: 29
 Empoasca radiata Gillette, 1898a: 738
 Empoasca ratio DeLong and Davidson, 1935a: 36
 Empoasca recta DeLong and Caldwell, 1934a: 606
 Empoasca recurvata DeLong, 1931b: 38
 Empoasca rubrarea Wheeler, 1939a: 295
 Empoasca ruficeps Van Duzee, 1917a: 304
 Empoasca sativae Poos, 1933a: 174
 Empoasca similis DeLong and Davidson, 1935a: 37
 Empoasca solana DeLong, 1931b: 50
 Empoasca spiculata Oman and Wheeler, 1938a: 141
 Empoasca tamia Davidson and DeLong, 1939a: 117
 Empoasca tinctoria DeLong, 1931b: 54
 Empoasca torqua DeLong and Davidson, 1935a: 35
 Empoasca ulsa Davidson and DeLong, 1942a: 105
 Empoasca unca DeLong and Davidson, 1935a: 35
 Empoasca varaspina Oman and Wheeler, 1938a: 141
 Empoasca vastitatis Oman and Wheeler, 1938a: 136
 Empoasca vergena DeLong and Caldwell, 1934a: 607
 Empoasca vermispina Oman and Wheeler, 1938a: 137
 Empoasca xerophila Oman and Wheeler, 1938a: 142

Smaragdula group

- Empoasca adunca DeLong, 1931b: 31
 Empoasca aureo-viridis (Uhler), 1877a: 474 (*Typhlocyba*)
 Empoasca carsona DeLong and Davidson, 1936a: 229
 Empoasca clypeata Gillette and Baker, 1895a: 108

- Empoasca copula DeLong, 1931b: 27
 Empoasca digita DeLong, 1931b: 26
 Empoasca gelbata DeLong and Davidson, 1936a: 225
 Empoasca grosata DeLong and Davidson, 1936a: 228
 Empoasca incida DeLong, 1931b: 21
 Empoasca jacinta DeLong and Davidson, 1936a: 227
 Empoasca livingstonii Gillette, 1898a: 728
 Empoasca luda Davidson and DeLong, 1938a: 94
 Empoasca obtusa Walsh, 1864a: 317 (*fide* Oman)
 Empoasca patula DeLong, 1931b: 22
 Empoasca reflexa DeLong, 1932c: 396
 Empoasca rubrafacia DeLong, 1932c: 394
 Empoasca rubrata DeLong and Davidson, 1936a: 226
 Empoasca salicis Wheeler, 1937a: 148
 Empoasca saluta DeLong, 1931b: 24
 Empoasca smaragdula (Fallén), 1806a: 37 (*Cicada*) (*fide* Van Duzee)
 Empoasca ziona DeLong and Davidson, 1936a: 227

Confusa group

- Empoasca apata DeLong and Davidson, 1936a: 228
 Empoasca atrolabes Gillette, 1898a: 736
 Empoasca bipunctata (Oshanin), 1871a: 212 (*Chlorita*) (*fide* Oman)
 Empoasca confusa DeLong and Davidson, 1936a: 229
 Empoasca maligna (Walsh), 1864a: 317 (*Chloroneura*) (*fide* Van Duzee)
 Empoasca obrudens DeLong, 1932c: 393
 Empoasca pergandei Gillette, 1898a: 735
 Empoasca unica Provancher, 1890b: 340

Empoasca species of uncertain position

- Empoasca acantha Davidson and DeLong, 1943a: 216
- Empoasca acodens DeLong, 1931b: 16
- Empoasca adexa Davidson and DeLong, 1943a: 216
- Empoasca albolinea Gillette, 1898a: 732
- Empoasca albonota DeLong, 1931b: 43
- Empoasca alboscripta Van Duzee, 1914a: 56
- Empoasca amblacantha Oman and Wheeler, 1938a: 140
- Empoasca arqua Davidson and DeLong, 1942a: 106
- Empoasca aspra Davidson and DeLong, 1943a: 218
- Empoasca barbara Hartzell, 1923a: 107
- Empoasca bicorna DeLong and Caldwell, 1934a: 604
- Empoasca bispinata Davidson and DeLong, 1943a: 216
- Empoasca bitubera DeLong, 1932c: 395
- Empoasca breviceps (Osborn), 1928a: 271 (*Dikraneura*), new combination
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- Empoasca brevidens DeLong in Wolcott, 1923b: 269
- Empoasca bulba Davidson and DeLong, 1943a: 218
- Empoasca caldwelli Davidson and DeLong, 1943a: 215
- Empoasca camara Davidson and DeLong, 1942a: 108

- Empoasca canalis* (Osborn), 1928a: 282 (*Joruma*), new combination (according to Dr. Oman)
- Empoasca canavalia* DeLong, 1932b: 114
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- Empoasca decorata* Osborn, 1924c: 452
- Empoasca denticula* Gillette, 1898a: 734
- Empoasca diacumanis* Davidson and DeLong, 1943b: 638
- Empoasca distracta* DeLong and Caldwell, 1934a: 607
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- Empoasca esuma* Goding, 1890b: 116
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- Empoasca hama* DeLong and Caldwell, 1934a: 605
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- Empoasca pallidula* DeLong, 1931b: 42
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- Empoasca* *sonorana* Wheeler, 1940a: 479
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- Empoasca* *sublactea* Van Duzee, 1917a: 302
- Empoasca* *tectona* Davidson and DeLong, 1943b: 639
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- Empoasca* *uvalda* Davidson and DeLong, 1939a: 115
- Empoasca* *valvata* Osborn, 1923a: 76 (?) (*Cicadula*) (according to Dr. Oman, unpublished)
- Empoasca* *venusta* DeLong and Davidson, 1935a: 33
- Empoasca* *vincula* DeLong, 1931b: 44
- Empoasca* *zonalis* (Osborn), 1928a: 283 (*Joruma*), new combination (according to Dr. Oman, unpublished)

ADDENDUM

Since the foregoing has been submitted to the editor, several publications on the Typhlocybinæ have appeared. These are included in the bibliography at the end of this section, and the species are listed below, in their respective genera. Those species prefixed with an asterisk have not been studied by the writer.

Genus *Parallaxis* McAtee

The species listed below cannot be placed with any certainty, because no males were available for study. The venation of the hind wing suggests a relationship with *Eualebra* in the Typhlocybini, but it seems advisable to retain the species in its original combination until males are studied.

Parallaxis jalapai DeLong and Ruppel, 1951a: 36

Genus *Alconeura* Ball and DeLong

The species not prefixed with an asterisk in the list below were examined before they had manuscript names, through the kindness of Dr. D. M. DeLong.

Alconeura *cinctella* DeLong and Ruppel, 1951c: 60

*Alconeura*¹ *languida* DeLong and Ruppel, 1951c: 57

1. This species, a primary homonym, is to be renamed by its author in a publication now in press.

- Alconeura rubella* DeLong and Ruppel, 1951c: 61
Alconeura rubranota DeLong and Ruppel, 1951c: 59
Alconeura separata DeLong and Ruppel, 1951c: 58
Alconeura similis DeLong and Ruppel, 1951c: 62
 * *Alconeura splendida* Knull, 1951a: 169

Erythroneura subg. *Erasmoneura* Young

- * *Erythroneura fiduciaria* Knull, 1951a: 170

Erythroneura subg. *Erythridula* Young

- * *Erythroneura ampla* Knull, 1951b: 179
 * *Erythroneura enata* Knull, 1951b: 179
 * *Erythroneura freta* Knull, 1951b: 179
 * *Erythroneura tolerata* Knull, 1951b: 180

Erythroneura subg. *Eratoneura* Young

- * *Erythroneura acantha* Ross and DeLong, 1950a: 296
 * *Erythroneura arenosa* Ross and DeLong, 1950a: 295
 * *Erythroneura coxi* Ross and DeLong, 1950a: 295
 * *Erythroneura cristata* Knull, 1951a: 174
 * *Erythroneura fausta* Knull, 1951a: 172
 * *Erythroneura igella* Ross and DeLong, 1950a: 295
 * *Erythroneura maga* Knull, 1951a: 170
 * *Erythroneura millsi* Ross and DeLong, 1950a: 291
 * *Erythroneura quercalbac* Ross and DeLong, 1950a: 294
 * *Erythroneura rangifer* Ross and DeLong, 1950a: 292
 * *Erythroneura spala* Ross and DeLong, 1950a: 294
 * *Erythroneura spinea* Knull, 1951a: 172
 * *Erythroneura stoveri* Ross and DeLong, 1950a: 296
 * *Erythroneura tenilla* Ross and DeLong, 1950a: 294
 * *Erythroneura tersa* Knull, 1951a: 172

Genus *Scinda* DeLong and Ruppel

Cicadella (*Scinda*) DeLong and Ruppel. Ohio Journ. Sci., vol. 51, p. 95. 1951. new status.

The species listed below are correctly placed in Typhlocybini, and are sufficiently distinct from *Eupteryx* Curtis to justify full generic status. Further study is needed to establish points of difference between this group of species and *Eupterella* DeLong and Ruppel, which is very closely related, if not identical.

- * *Scinda cireula* DeLong and Ruppel, 1951b: 96
 * *Scinda cochlea* DeLong and Ruppel, 1951b: 96
 * *Scinda cordoba* DeLong and Ruppel, 1951b: 96
 * *Scinda scarlatine* DeLong and Ruppel, 1951b: 95

Genus *Empoasca* Walsh

Empoasca mira Knull, 1951a: 169

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pallida Gillette, <i>Empoasca</i>	118
pallida Osborn, <i>Protalebra</i>	37
pallida Knull and Auten, <i>Erythroneura</i>	88
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ziona DeLong and Davidson, Empoasca	116
zioni Beamer, Erythroneura	88
zonalis (Osborn), Empoasca	119

PLATE 1

(Used Through the Courtesy of P. W. Oman)

FIG. 1. A deltocephaline leafhopper, showing the structures of the dorsum.

FIG. 2. A deltocephaline leafhopper, showing the structures of the face.

FIG. 3. A deltocephaline leafhopper, terminus of venter, female, showing structure of the external genitalia.

FIG. 4. A deltocephaline leafhopper, terminus of venter, male, showing the structure of the external male genitalia.

PLATE 1

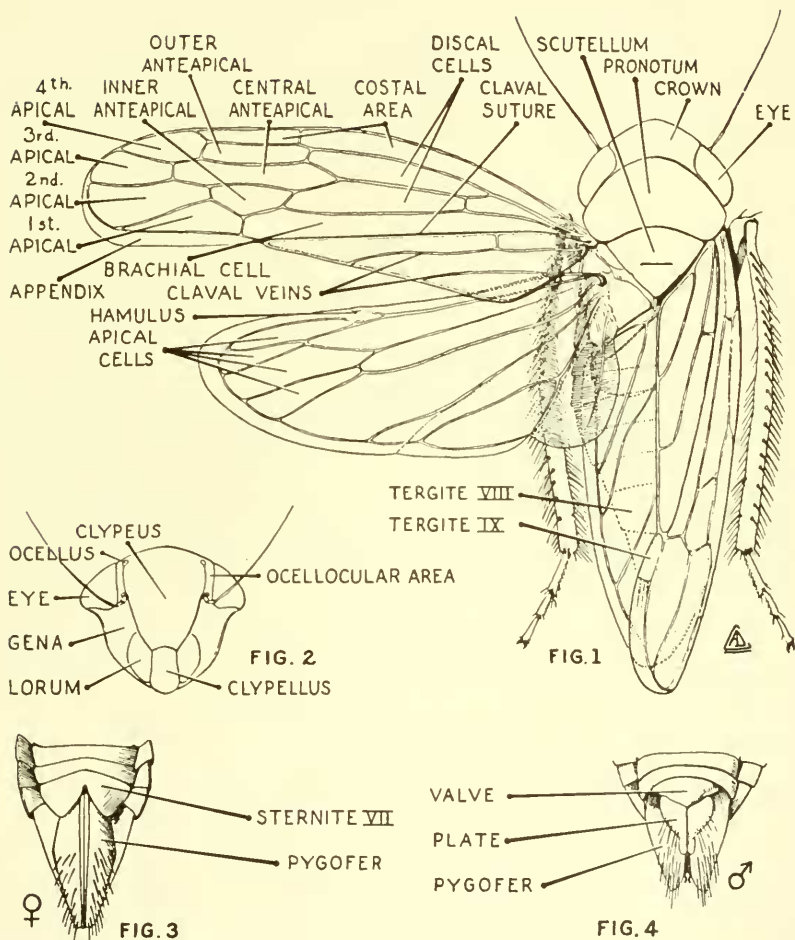


PLATE 2

FIG. 5. A typhlocybine leafhopper, hind wing, showing the wing veins.

FIG. 6. A typhlocybine leafhopper, fore wing, showing some of the veins used in the present classification.

FIG. 7. A hypothetical typhlocybine aedeagus, showing structures used in this classification.

FIG. 8. *Dikrellidia bilineata*, right style and connective, dorsal aspect ($\times 286$), showing structures used in classification.

PLATE 2

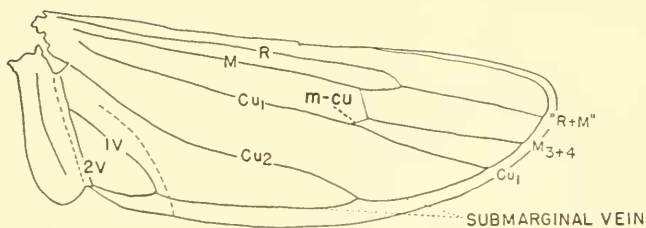


FIG. 5. HIND WING

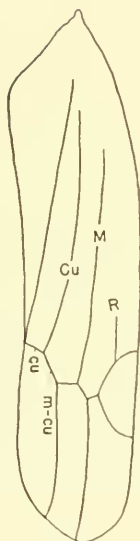


FIG. 6. FORE WING

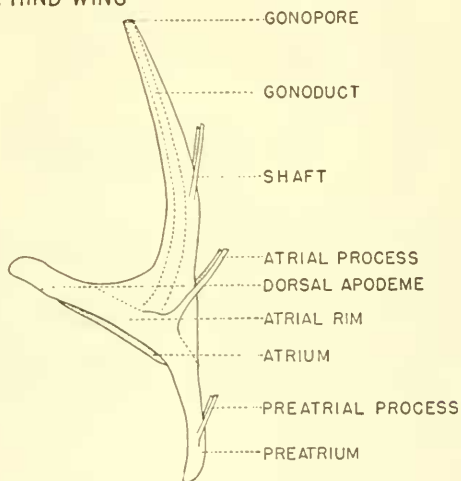


FIG. 7.
AEDEAGUS, SCHEMATIC

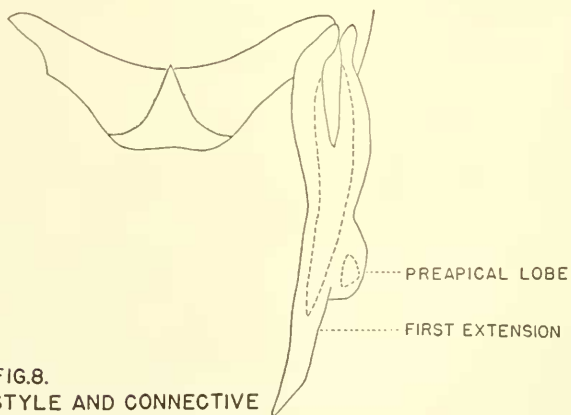


FIG. 8.
STYLE AND CONNECTIVE

PLATE 3

FIG. 9. *Zygina scutellaris*, apex of right style, broad aspect ($\times 286$).

FIG. 10. *Erythroneura mansueta*, apex of right style, broad (dorsal) aspect ($\times 286$).

FIG. 11. *E. bifurca*, apex of right style, broad (dorsal) aspect ($\times 286$).

FIG. 12. *E. idonea*, apex of right style, broad (dorsal) aspect ($\times 286$).

FIG. 13. *E. nitida*, apex of right style, broad aspect ($\times 286$).

FIG. 14. *E. aenea*, apex of right style, broad (dorsal) aspect ($\times 286$).

FIG. 15. *E. reflecta*, apex of right style, broad (ventral) aspect ($\times 286$).

PLATE 3

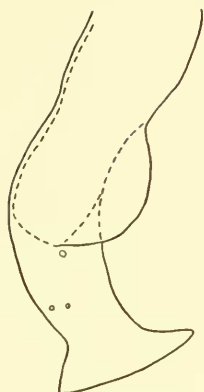


FIG. 9
ZYGINA SCUTELLARIS

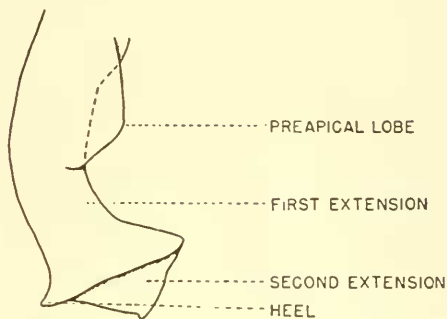


FIG. 10
ERYTHRONEURA MANSUETA

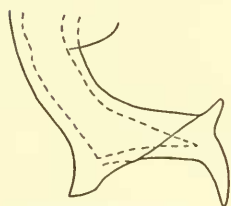


FIG. 11
ERYTHRONEURA
BIFURCA

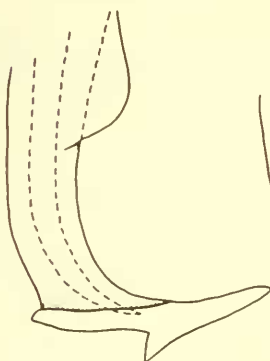


FIG. 12
ERYTHRONEURA
IDONEA

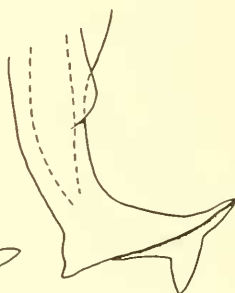


FIG. 13
ERYTHRONEURA
NITIDA

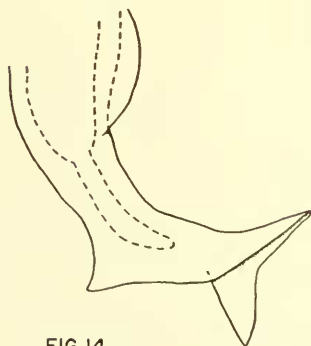


FIG. 14
ERYTHRONEURA AENEA

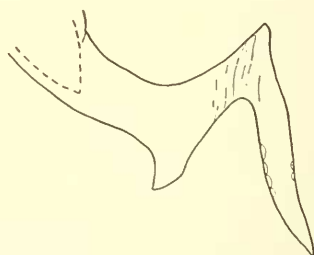


FIG. 15
ERYTHRONEURA REFLECTA

PLATE 4

FIG. 16. *Hadralebrea laticeps*

- C. Type, male genital capsule, lateral aspect ($\times 100$).
- D. Type, right style and connective, dorsal aspect ($\times 286$).
- E. Type, aedeagus lateral aspect ($\times 286$).

FIG. 17. *Aphanalebrea unipuncta*

- A. Hind wing (venation compared with type).
- B. Fore wing (venation compared with type).
- C. Holotype, male genital capsule, lateral aspect ($\times 100$).
- D. Holotype, right style, apical half, dorsal aspect ($\times 286$).
- E. Holotype, aedeagus, right lateral aspect ($\times 134$).

PLATE 4

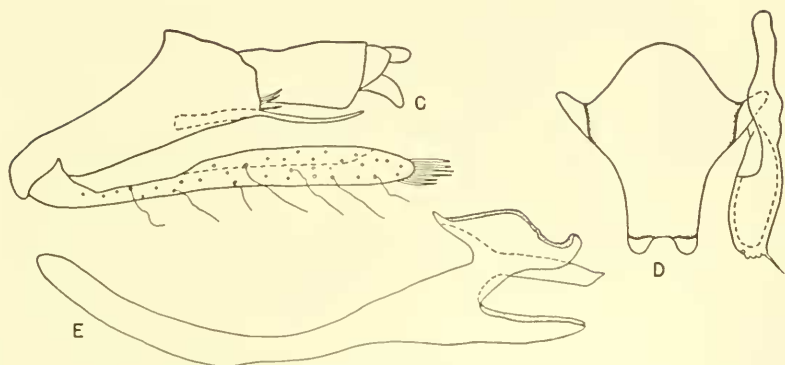


FIG. 16 HADRALEBRA LATICEPS

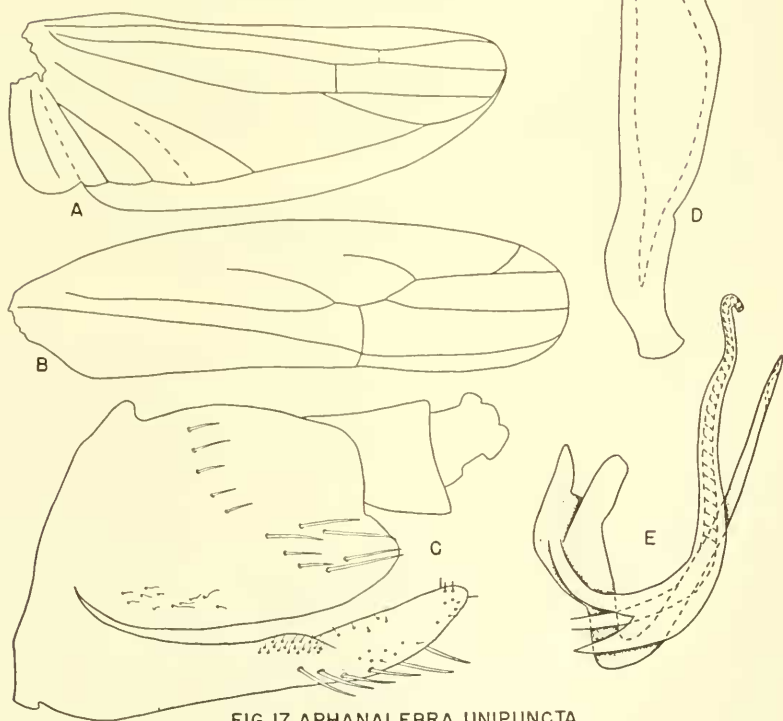


FIG. 17 APHANALEBRA UNIPUNCTA

PLATE 5

FIG. 18. *Rabela tabebuiae*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect, anal tube not shown ($\times 100$).
- D. Right style, apical half, broad aspect ($\times 286$).
- E. Aedeagus, lateral aspect ($\times 286$).

FIG. 19. *Kallebra ninettae*

- B. Fore wing, sketch.
- C. Holotype, male genital capsule, lateral aspect ($\times 100$).
- E. Holotype, aedeagus, lateral aspect ($\times 213$).

PLATE 5

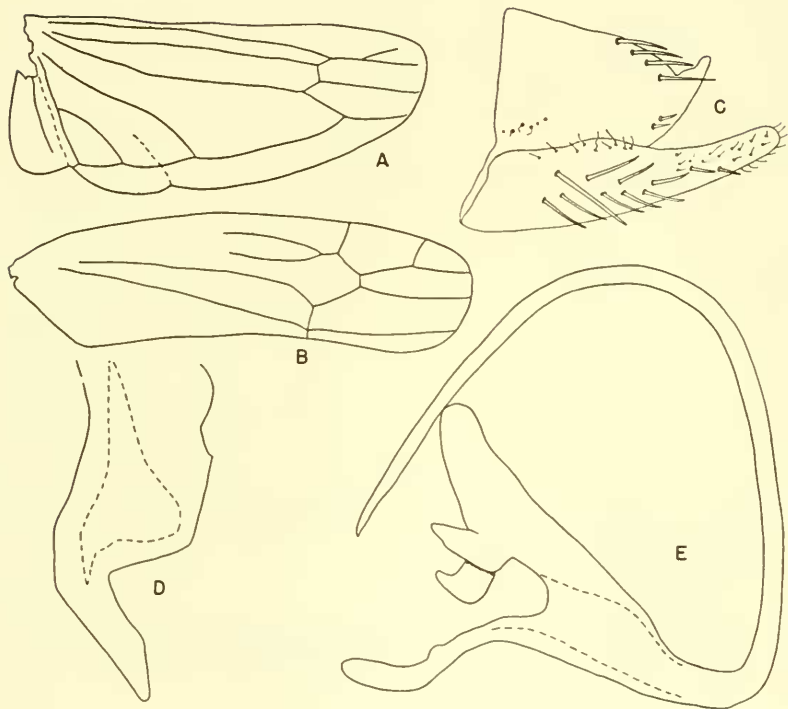


FIG.18 RABELA TABEBUIAE

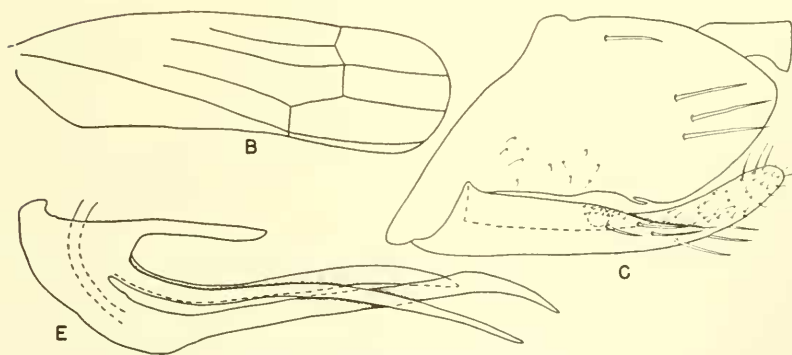


FIG.19 KALLEBRA NINETTAE

PLATE 6

FIG. 20. *Kallebra ninettae*, holotype, right style, dorsal aspect ($\times 286$).

FIG. 21. *Orsalebra robusta*.

A. Holotype, hind wing.

B. Holotype, fore wing.

C. Holotype, male genital capsule, lateral aspect ($\times 100$).

D. Holotype, right style, apical third, lateral aspect ($\times 286$).

PLATE 6

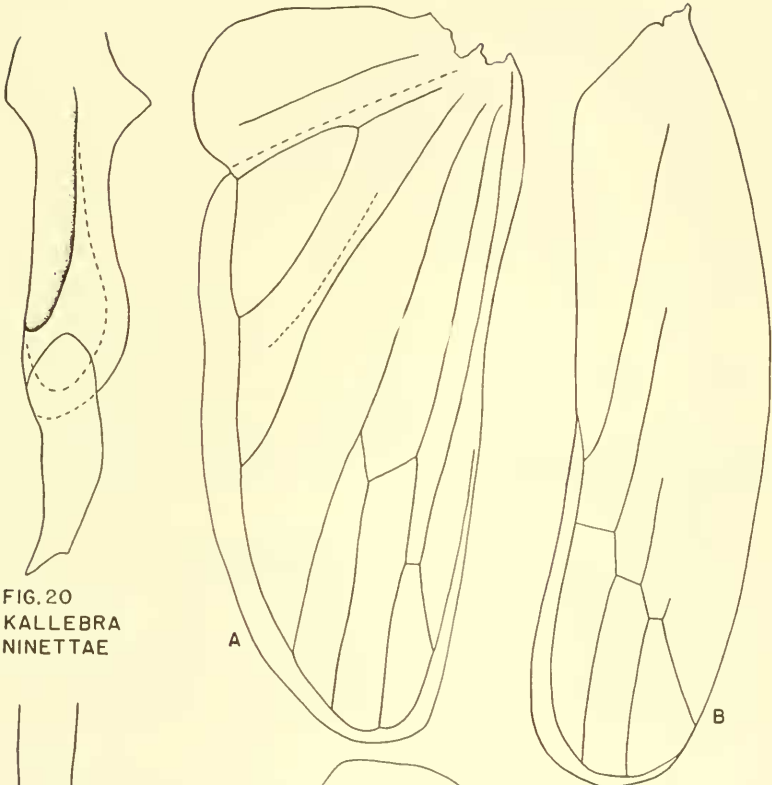


FIG. 20
KALLEBRA
NINETTAE

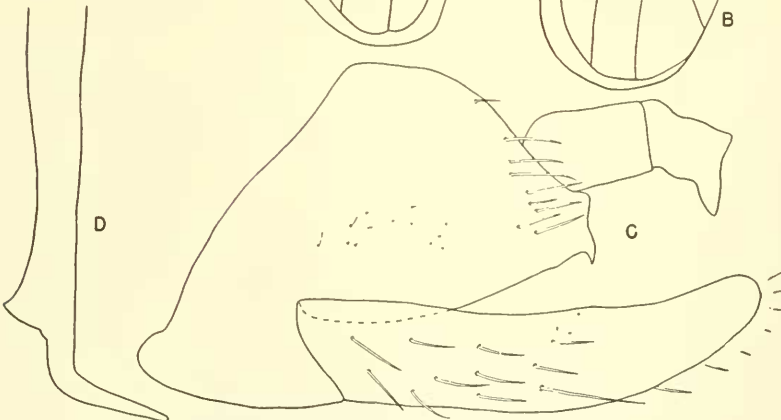


FIG. 21 ORSALEBRA ROBUSTA

PLATE 7

FIG. 22. *Orsalebra robusta*, holotype, aedeagus, lateral aspect ($\times 100$).

FIG. 23. *Balera pellucida*

A. Hind wing.

B. Fore wing.

C. Type, male genital capsule, lateral aspect ($\times 100$).

D. Type, right style, entire, broad aspect ($\times 286$).

E. Type, aedeagus, lateral aspect ($\times 286$).

FIG. 24. *Diceratalebra sanguinolinea*

D. Right style, dorsal aspect ($\times 286$).

E. Aedeagus, lateral aspect ($\times 286$).

PLATE 7

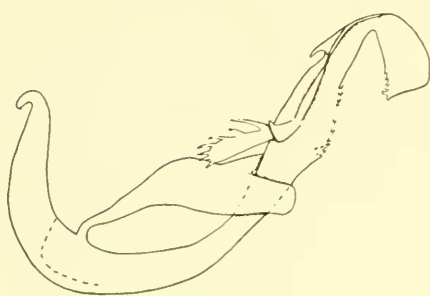


FIG. 22
ORSALEBRA ROBUSTA

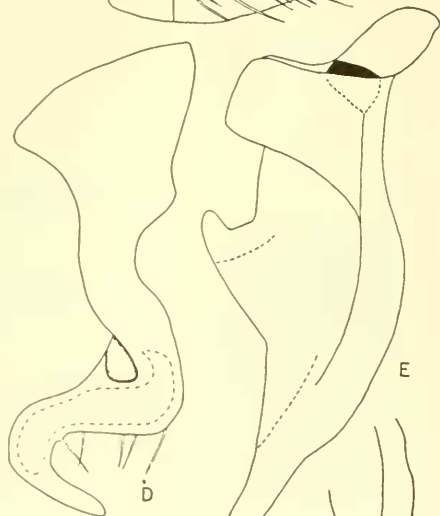
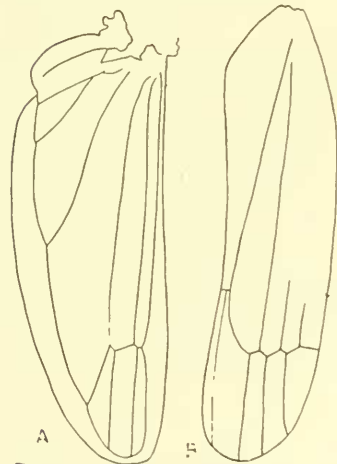
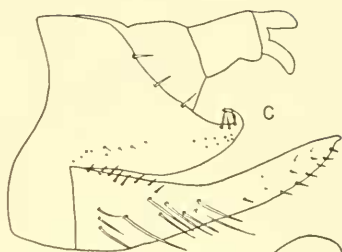


FIG. 23
BALERA PELLUCIDA

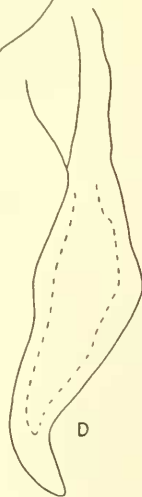
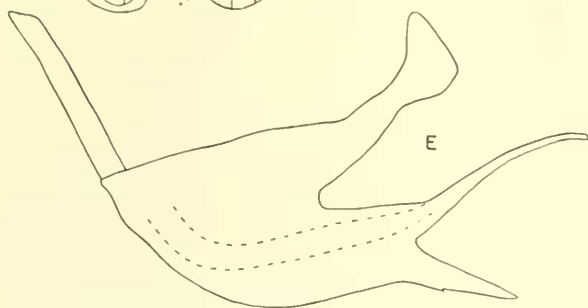


FIG. 24 DICERATALEBRA SANGUINOLINEA

PLATE 8

FIG. 25. *Diceratalebra sanguinolinea*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect ($\times 100$).

FIG. 26. *Trypanalebra*

- A. *Trypanalebra* sp., hind wing.
- B. *Trypanalebra* sp., fore wing.
- C. *Trypanalebra* sp., male genital capsule, lateral aspect ($\times 100$).
- D. *Trypanalebra* sp., right style, dorsal aspect ($\times 286$).
- E. *Trypanalebra* sp., aedeagus, lateral aspect ($\times 213$).

PLATE 8

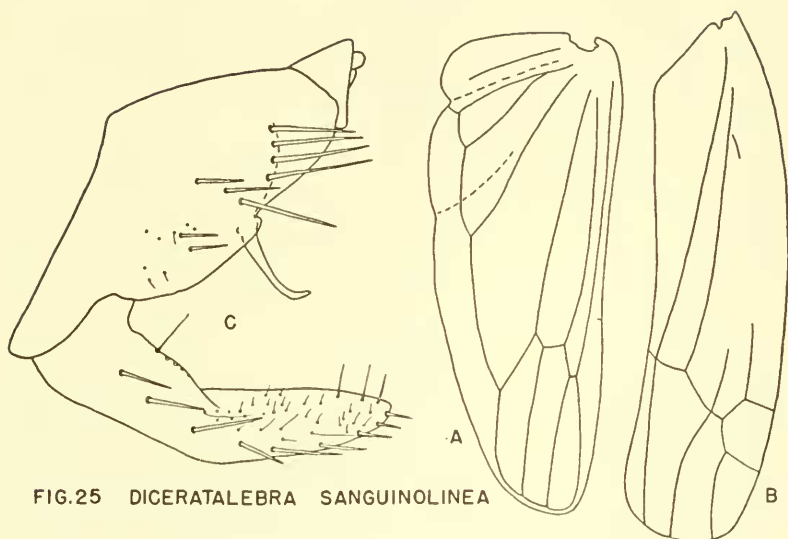


FIG.25 DICERATALEBRA SANGUINOLINEA

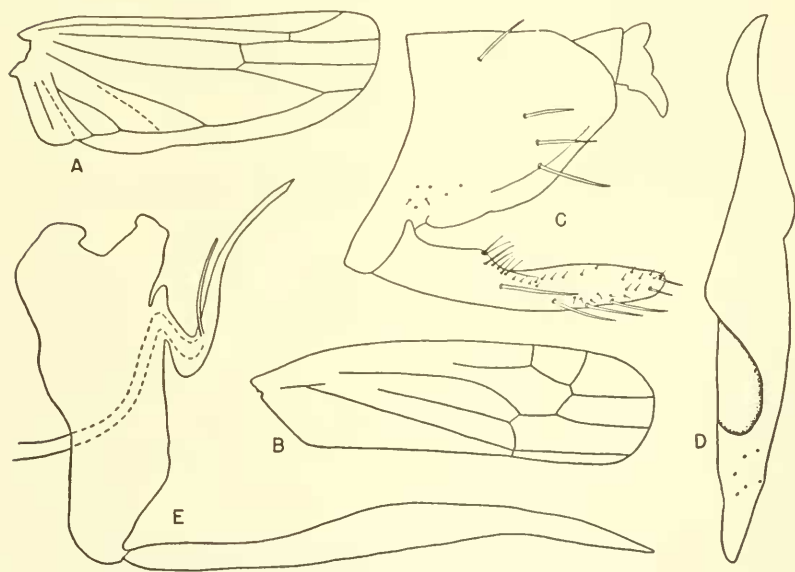


FIG.26 TRYPANALEBRA

PLATE 9

FIG. 27. *Paralebra*

- A. *Paralebra* sp. near *similis*, hind wing (venation compared with type of *similis*).
- B. *Paralebra* sp. near *similis*, fore wing (venation compared with type of *similis*).
- C. *Paralebra similis*, holotype, male genital capsule, lateral aspect ($\times 100$).
- D. *Paralebra similis*, holotype, right style, dorsal aspect ($\times 286$).
- E. *Paralebra similis*, holotype, aedeagus, lateral aspect ($\times 286$).
- F. *Paralebra similis*, paratype, fore wing.

FIG. 28. *Alebra albostrilla*

- B. Fore wing.
- D. Style and connective, dorsal aspect ($\times 67$).

TABLE 9

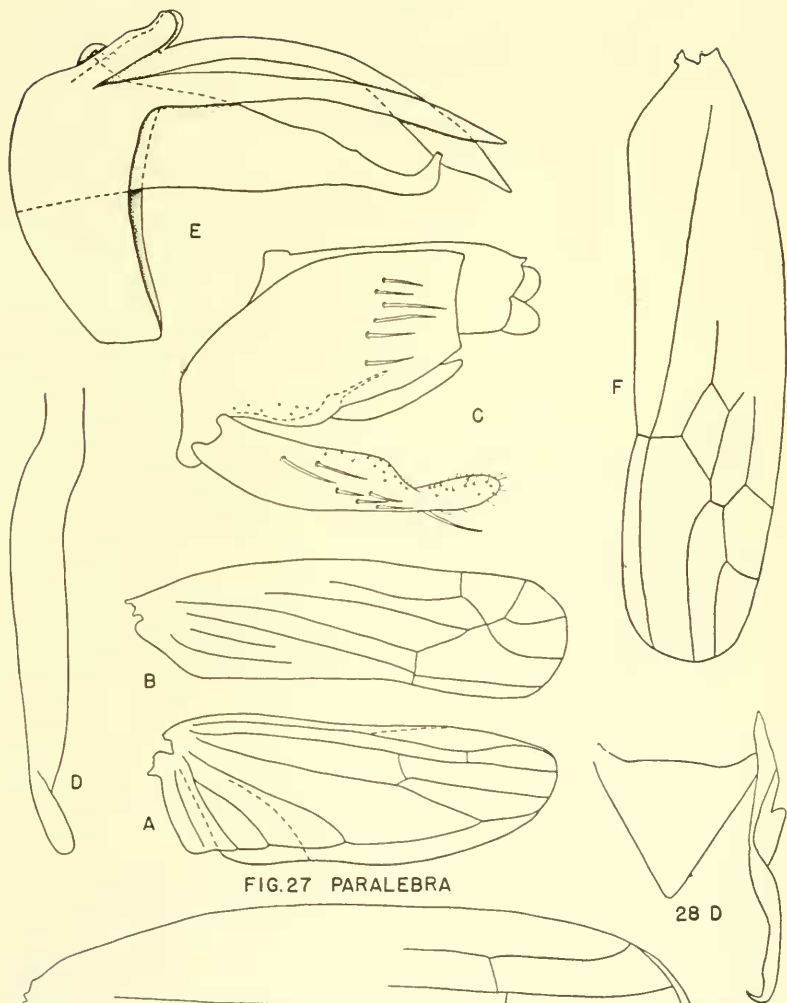


FIG. 27 *PARALEBRA*

28 D

FIG. 28 *ALEBRA ALBOSTRIELLA*

PLATE 10

FIG. 29. *Alebra albostriella*

A. Hind wing.

C. Male genital capsule, lateral aspect, anal tube not shown ($\times 100$).

E. Aedeagus, lateral aspect ($\times 100$).

FIG. 30. *Brunerella magnifica*

A. Holotype, hind wing.

B. Holotype, fore wing.

D. Holotype, right style, broad aspect (ventrolateral) ($\times 286$).

E. Holotype, aedeagus, dorsal aspect ($\times 286$).

PLATE 10

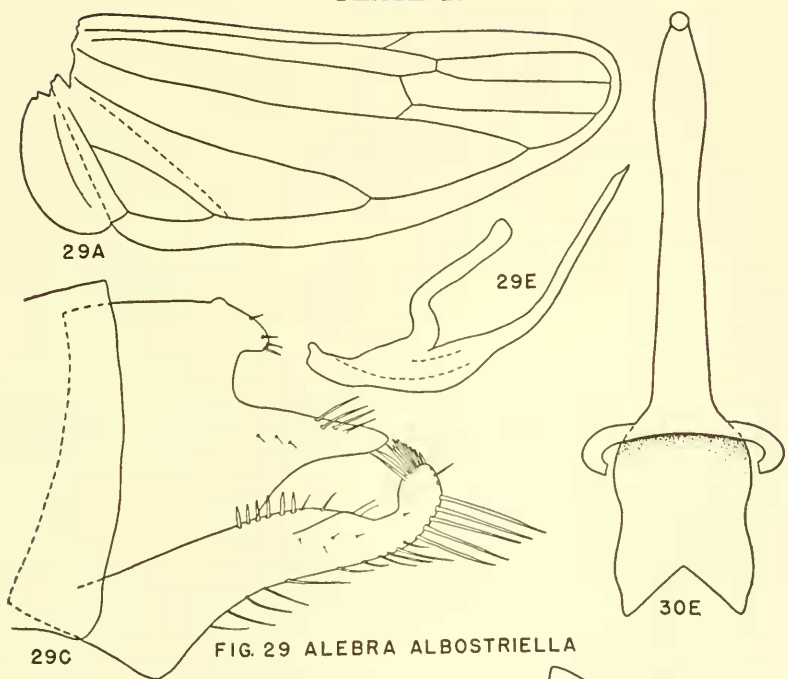


FIG. 29 ALEBRA ALBOSTRIELLA

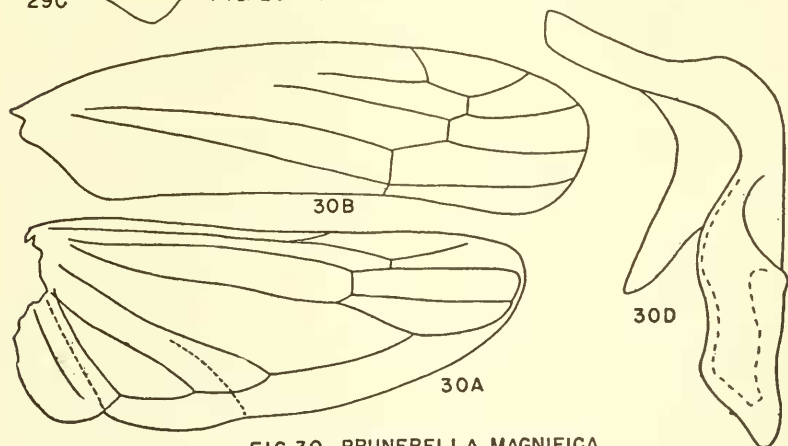


FIG. 30 BRUNERELLA MAGNIFICA

PLATE 11

FIG. 31. *Brunerella magnifica*, holotype, male genital capsule, lateral aspect ($\times 100$).

FIG. 32. *Habralebra nicaraguensis*

A. Hind wing.

B. Fore wing.

C. Male genital capsule, lateral aspect ($\times 100$).

D. Right style, apical seven ninths, broad aspect (dorsal) ($\times 286$).

E. Aedeagus, lateral aspect ($\times 286$).

FIG. 33. *Elabra eburneola*

D. Right style and connective, dorsal aspect ($\times 286$).

E. Aedeagus, lateral and slightly ventral aspect ($\times 213$).

PLATE 11

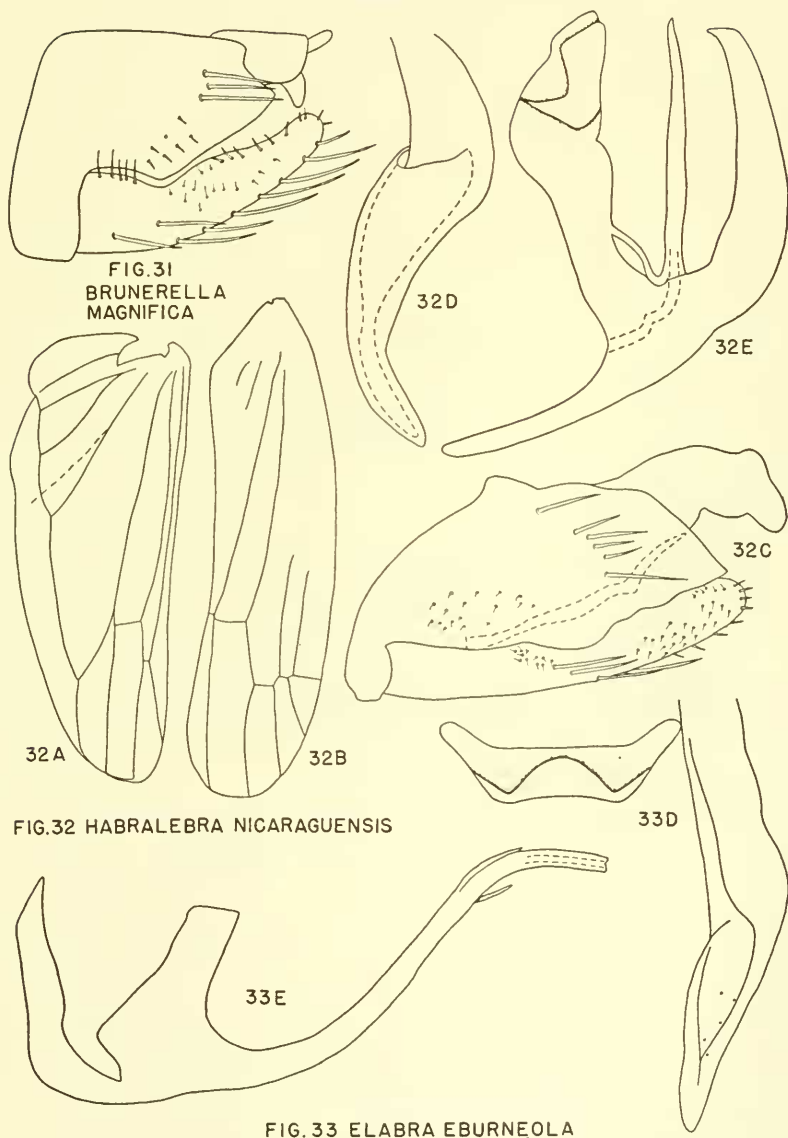


PLATE 12

FIG. 34. *Elabra eburneola*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect ($\times 100$).

FIG. 35. *Rhabdotalebra octolineata*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect, anal tube not shown ($\times 100$).
- D. Right style apex, apical two-thirds, dorsal aspect ($\times 286$).

PLATE 12

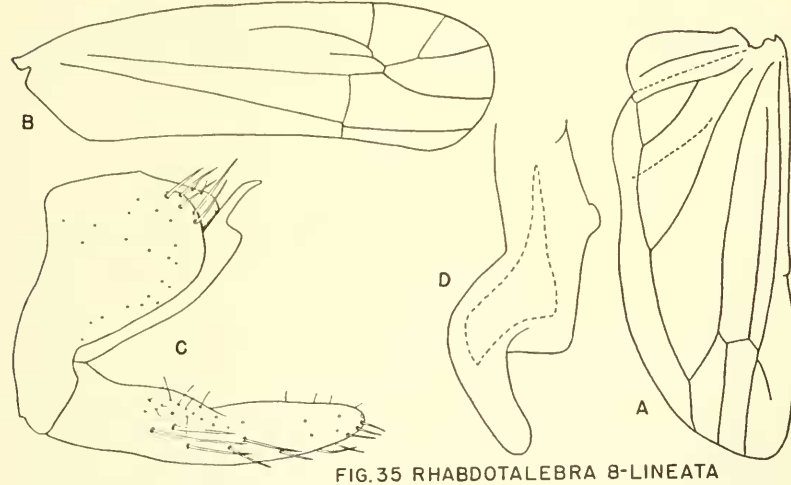
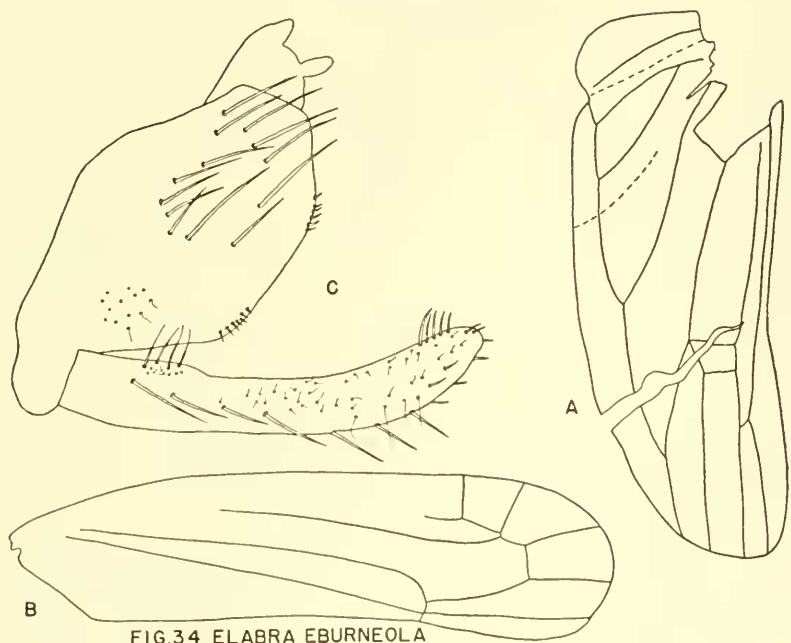


PLATE 13

FIG. 36. *Rhabdotalebra octolineata*, aedeagus, lateral aspect ($\times 286$).

FIG. 37. *Protalebra*

A. *Protalebra* sp. near *curvilinea*, hind wing.

B. *Protalebra* sp. near *curvilinea*, fore wing.

C. *Protalebra curvilinea*, holotype, male genital capsule, lateral aspect ($\times 100$).

D. *Protalebra curvilinea*, holotype, right style, apical half, dorsal aspect ($\times 286$).

E. *Protalebra curvilinea*, holotype, aedeagus, lateral aspect ($\times 213$).

FIG. 38. *Protalebrella brasiliensis*, paratype, aedeagus, lateral aspect ($\times 286$).

PLATE 13

FIG. 36
RHABDOTALEBRA
OCTOLINEATA

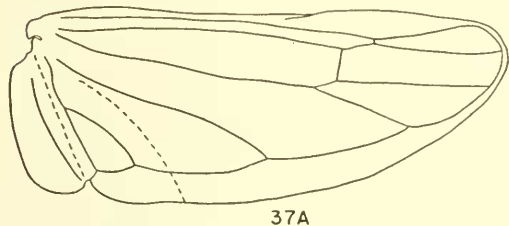
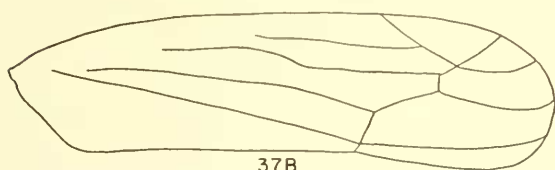
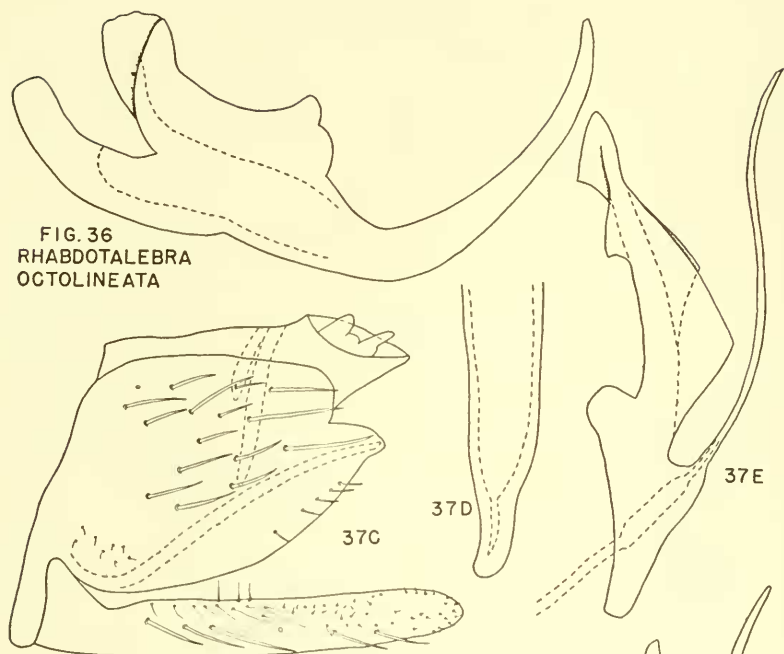


FIG. 37 PROTALEBRA

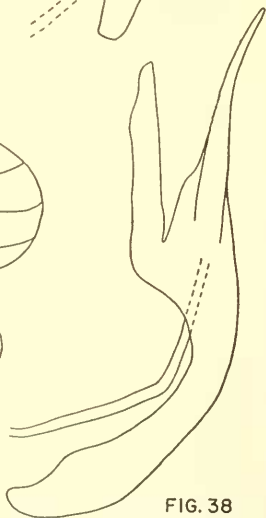


FIG. 38
PROTALEBRELLA
BRASILIENSIS

PLATE 14

FIG. 39. *Protalebrella brasiliensis*

- A. Hind wing.
- B. Fore wing.
- C. Paratype, male genital capsule, lateral aspect ($\times 100$).
- D. Paratype, right style ($\times 286$).

FIG. 40. *Dicranoneura loca*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect ($\times 67$).
- D. Right style, dorsal aspect ($\times 100$).
- E. Aedeagus, lateral aspect ($\times 100$).
- F. Male ninth sternum, from within ($\times 67$).

PLATE 14

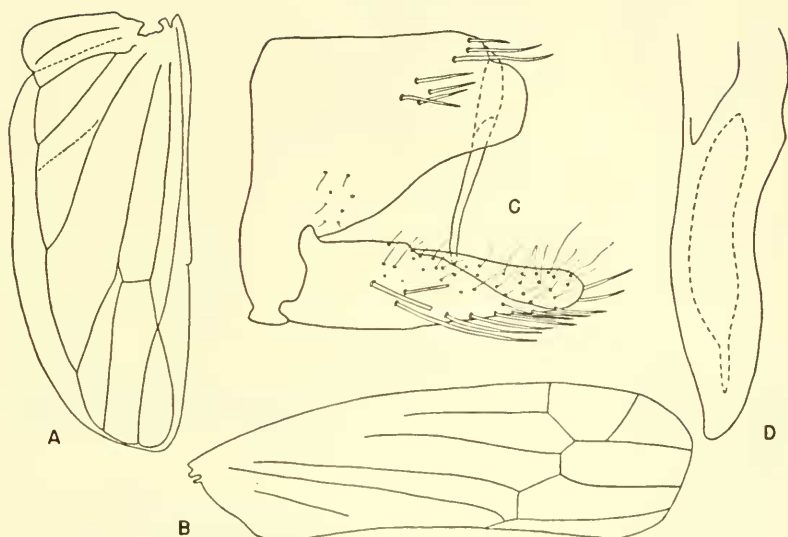


FIG.39 *PROTALEBRELLA BRASILIENSIS*

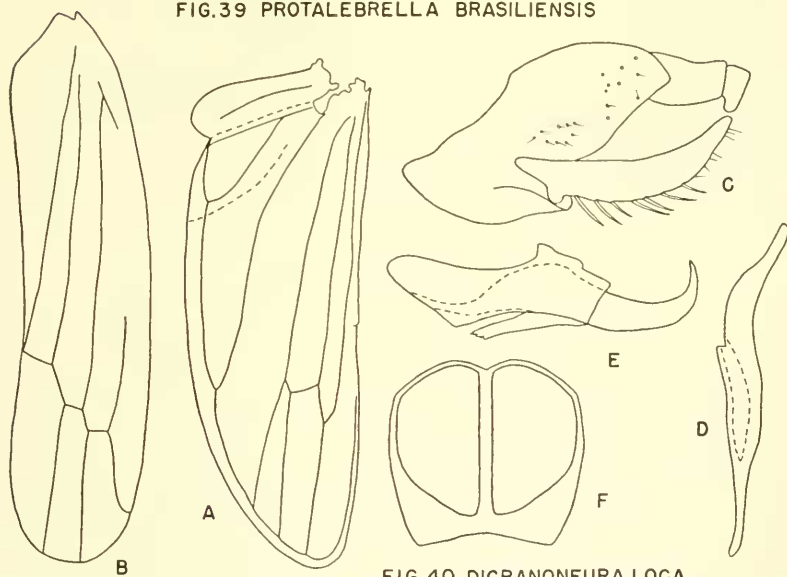


FIG.40 *DICRANONEURA LOCA*

PLATE 15

FIG. 41. *Dicranoneura loca*, external male genitalia, from unmacerated specimen.

FIG. 42. *Notus*

- A. *Notus alta*, hind wing.
- B. *Notus alta*, fore wing.
- C. *Notus flavipennis*, male genital capsule, lateral aspect ($\times 67$).
- D. *Notus alta*, right style, dorsal aspect ($\times 286$).
- E. *Notus alta*, aedeagus, caudal aspect ($\times 100$).
- F. *Notus flavipennis*, apex of male abdomen, ventral aspect.
- G. *Notus flavipennis*, apex of female abdomen, ventral aspect.

FIG. 43. *Dikraneura variata*

- C. Male genital capsule, lateral aspect ($\times 100$).
- E. Aedeagus, lateral aspect ($\times 100$).

PLATE 15

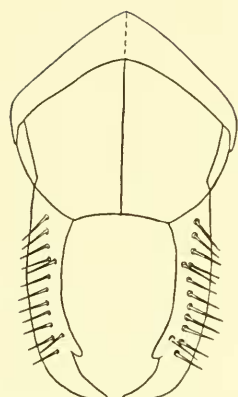
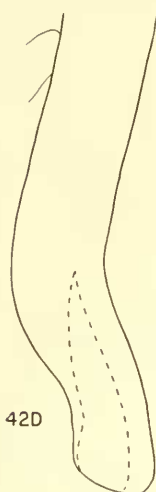


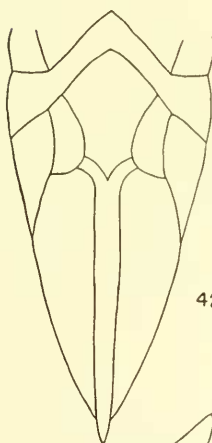
FIG. 41 DICRANONEURA
LOCA



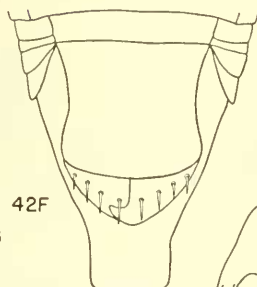
42D



42C

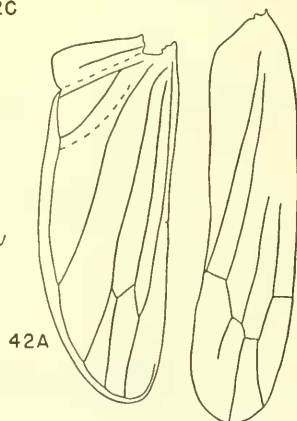


42G

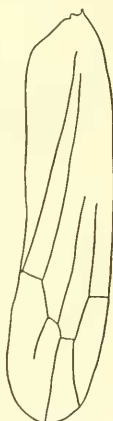


42F

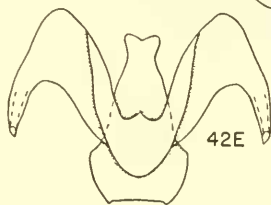
FIG. 42 NOTUS



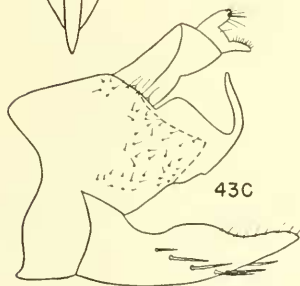
42A



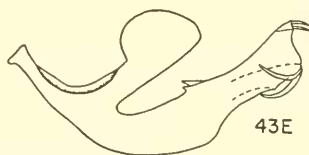
42B



42E



43C



43E

FIG. 43 DIKRANEURA VARIATA

PLATE 16

FIG. 44. *Dikraneura* (*Dikraneura*) *variata*

A. Hind wing.

B. Fore wing.

D. Right style, broad aspect (ventral) ($\times 286$).

F. Connective, broad aspect ($\times 286$).

FIG. 45. *Dikraneura* (*Delongia*) *luna*

A. Hind wing.

B. Fore wing.

C. Male genital capsule, lateral aspect ($\times 100$).

FIG. 46. *Parallaxis*

E. *Parallaxis Donaldsoni*, aedeagus, lateral aspect ($\times 213$) (from the holotype of *P. vacillans*).

F. *Parallaxis* sp., fore wing.

PLATE 16

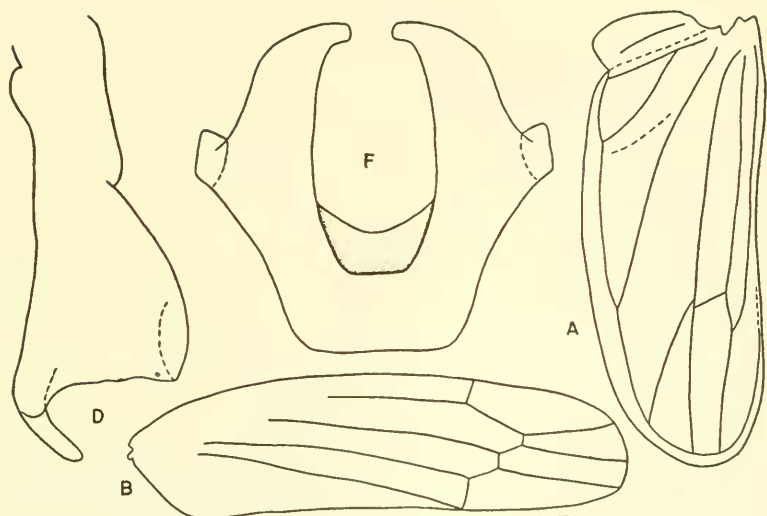


FIG.44 DIKRANEURA VARIATA

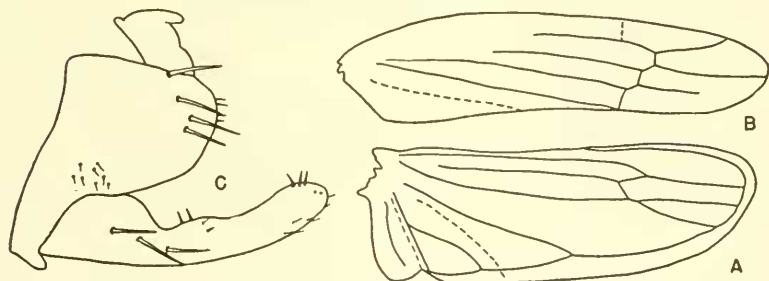


FIG.45 DIKRANEURA LUNA

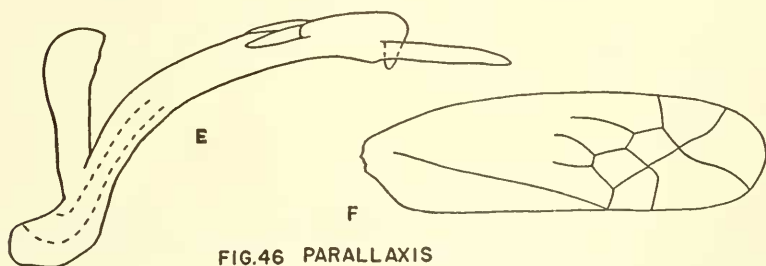


FIG.46 PARALLAXIS

PLATE 17

FIG. 47. *Parallaxis*

- A. *Parallaxis Donaldsoni*, hind wing.
- B. *Parallaxis Donaldsoni*, fore wing (venation compared with type).
- C. *Parallaxis* sp., male genital capsule, lateral aspect ($\times 100$).
- D. *Parallaxis* sp., right style, broad aspect ($\times 286$).

FIG. 48. *Typhlocybella minima*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect ($\times 134$).
- D. Right style, dorsal aspect ($\times 286$).
- E. Aedeagus, lateral and slightly ventral aspect ($\times 286$).
- F. Connective and base of aedeagus, dorsal aspect ($\times 286$).

PLATE 17

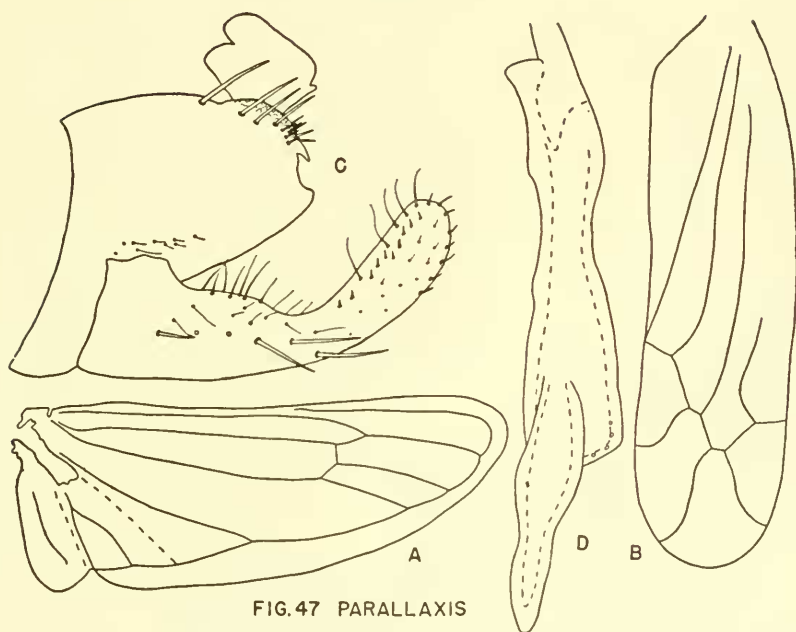


FIG.47 PARALLAXIS

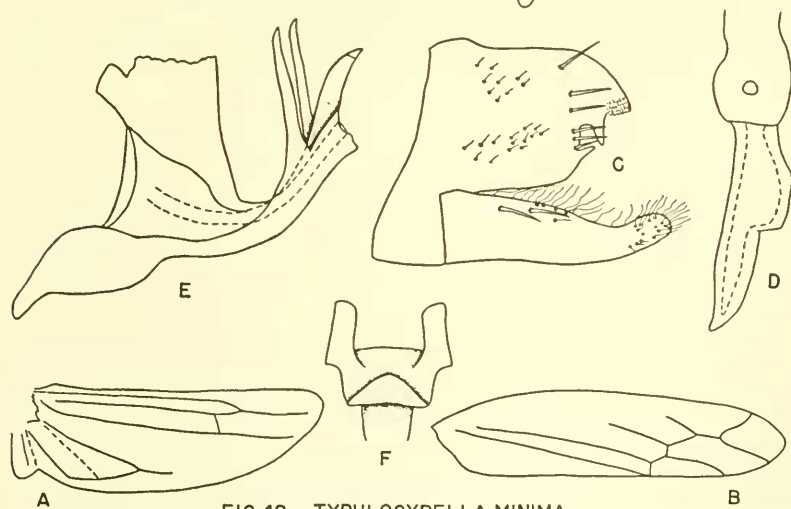


FIG.48 TYPHLOCYBELLA MINIMA

PLATE 18

FIG. 49. *Kunzeana kunzei*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect ($\times 134$).
- D. Right style, dorsal aspect ($\times 286$).
- E. Aedeagus, lateral aspect ($\times 286$).

FIG. 50. *Endoxoneura splendidula*

- B. Apex of fore wing, sketch.
- C. Type, male genital capsule, lateral aspect ($\times 100$).
- D. Type, right style and connective, dorsal aspect ($\times 286$).
- E. Type, aedeagus, ventrolateral aspect ($\times 286$).

FIG. 51. *Kidrella santana*, aedeagus, ventrolateral aspect ($\times 286$).

PLATE 18

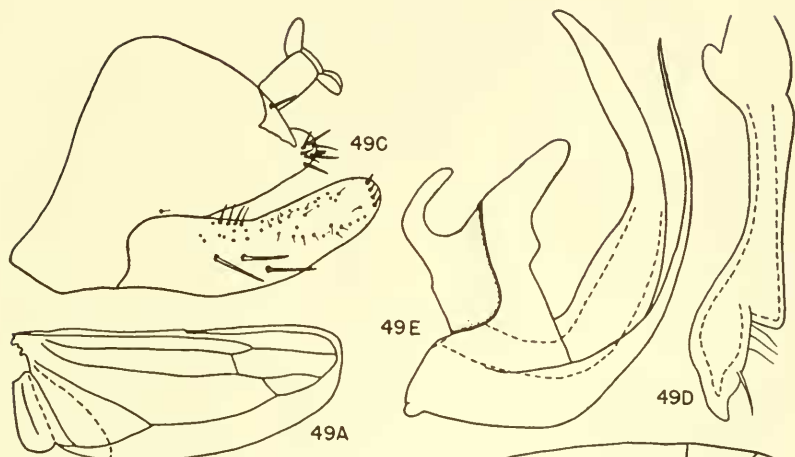


FIG. 49 KUNZEANA KUNZEI

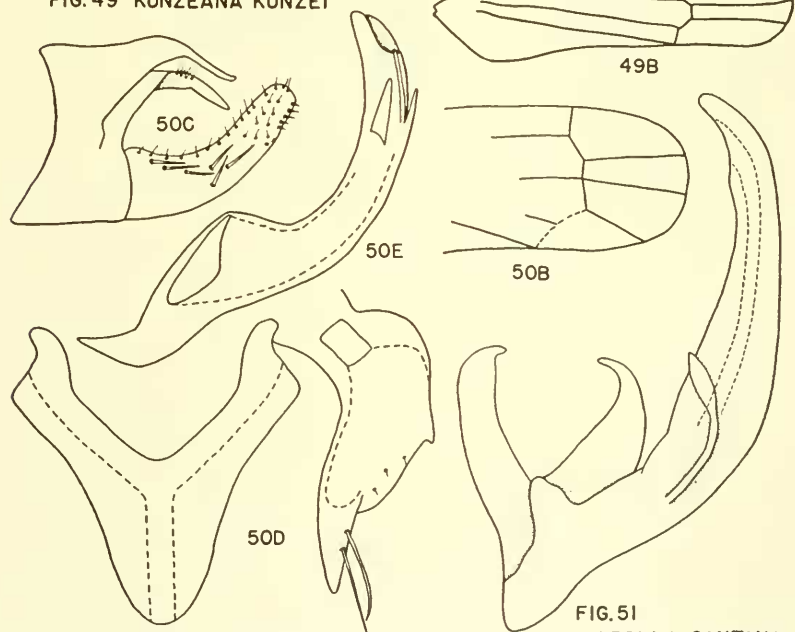


FIG. 50 ENDOXONEURA SPLENDIDULA

FIG. 51
KIDRELLA SANTANA

PLATE 19

FIG. 52. *Kidrella santana*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect ($\times 100$).
- D. Apex of right style, broad aspect (ventral) ($\times 286$).
- F. Connective, ventral aspect ($\times 286$).

FIG. 53. *Donidea verticis*

- B. Fore wing, sketch.
- C. Male genital capsule, lateral aspect ($\times 100$).
- D. Right style, near-dorsal aspect ($\times 286$).
- E. Aedeagus, ventrolateral aspect ($\times 286$).

PLATE 19

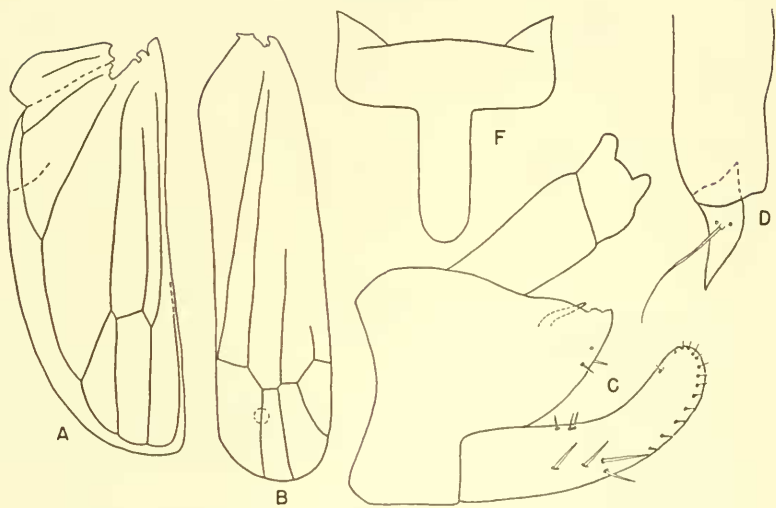


FIG.52 KIDRELLA

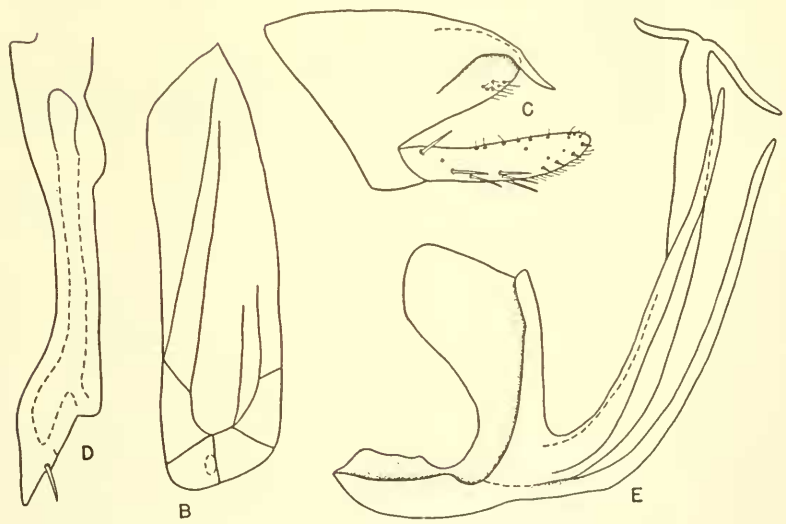


FIG.53 DONIDEA VERTICIS

PLATE 20

FIG. 54. *Alconeura* (*Alconeura*)

- A. *Alconeura rotundata*, hind wing.
- B. *Alconeura rotundata*, fore wing.
- C. *Alconeura rotundata*, genital capsule, lateral aspect ($\times 100$).
- D. *Alconeura rotundata*, right style, ventral aspect ($\times 286$).
- F. *Alconeura dodonana*, fore wing.
- G. *Alconeura santaritana*, fore wing.
- H. *Alconeura unipuncta*, right style apex, ventral aspect ($\times 286$).

FIG. 55. *Alconeura* (*Hyloidea*) *depressa*

- A. Hind wing.
- B. Fore wing.
- D. Right style, apex, dorsal aspect ($\times 286$).
- E. Connective and aedeagus, ventral aspect, shaft turned slightly laterad ($\times 213$).

PLATE 20

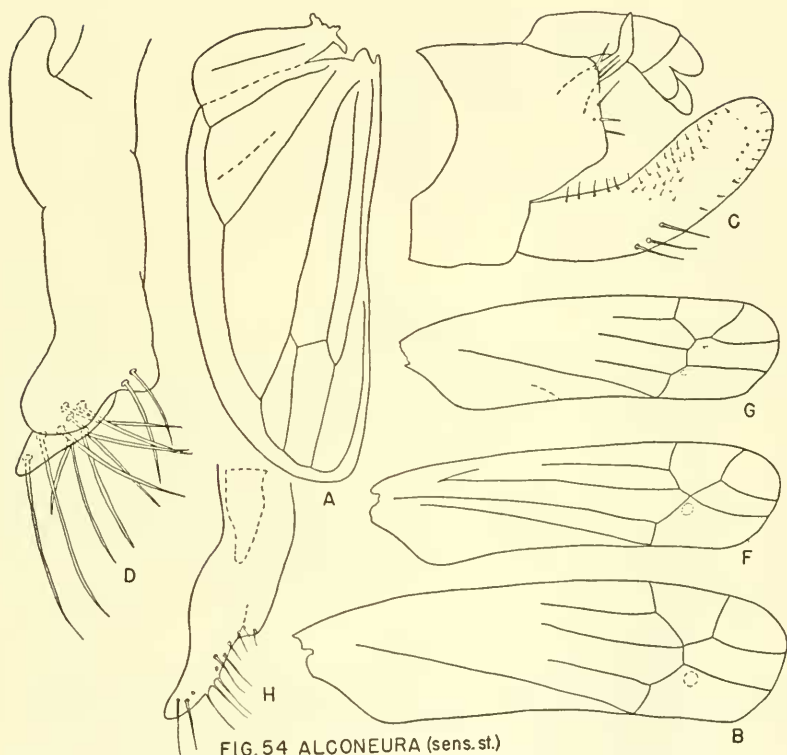


FIG. 54 *ALCONEURA* (sens. st.)

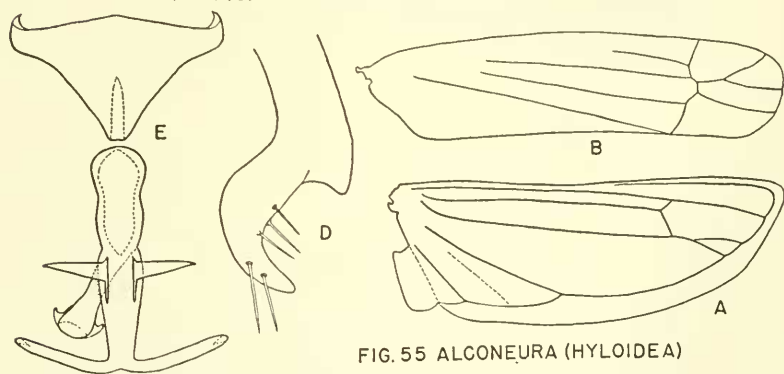


FIG. 55 *ALCONEURA* (HYLOIDEA)

PLATE 21

FIG. 56. *Alconeura* (*Hyloidea*)

- C. *Alconeura* (*Hyloidea*) *depressa*, male genital capsule, lateral aspect ($\times 100$).
- F. *Alconeura* (*Hyloidea*) *beameri*, male genital capsule, lateral aspect ($\times 100$).
- G. *Alconeura* (*Hyloidea*) *beameri*, right style, broad aspect ($\times 286$).
- H. *Alconeura* (*Hyloidea*) *beameri*, aedeagus, lateral aspect ($\times 286$).
- I. *Alconeura* (*Hyloidea*) *beameri*, hind wing.
- J. *Alconeura* (*Hyloidea*) *beameri*, fore wing.

FIG. 57. *Dikrella* (*Dikrella*)

- A. *Dikrella cockerellii*, hind wing.
- B. *Dikrella cockerellii*, fore wing.
- C. *Dikrella cockerellii*, male genital capsule, lateral aspect ($\times 100$).
- D. *Dikrella cockerellii*, right style, broad aspect (dorsal) ($\times 286$).
- E. *Dikrella cockerellii*, aedeagus, lateral aspect ($\times 286$).
- F. *Dikrella cruentata*, fore wing.
- G. *Dikrella californica* var. *imbellis*, right style, dorsal aspect ($\times 286$).

PLATE 21

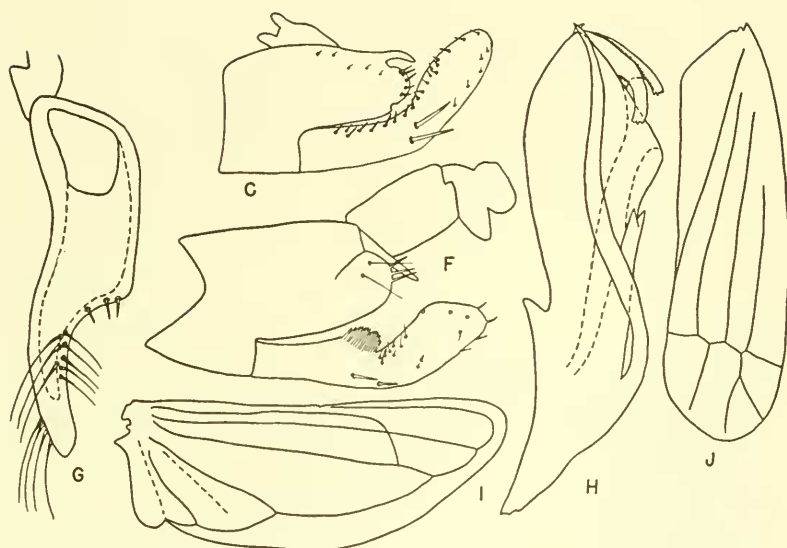


FIG. 56 *ALCONEURA* (HYLOIDEA)

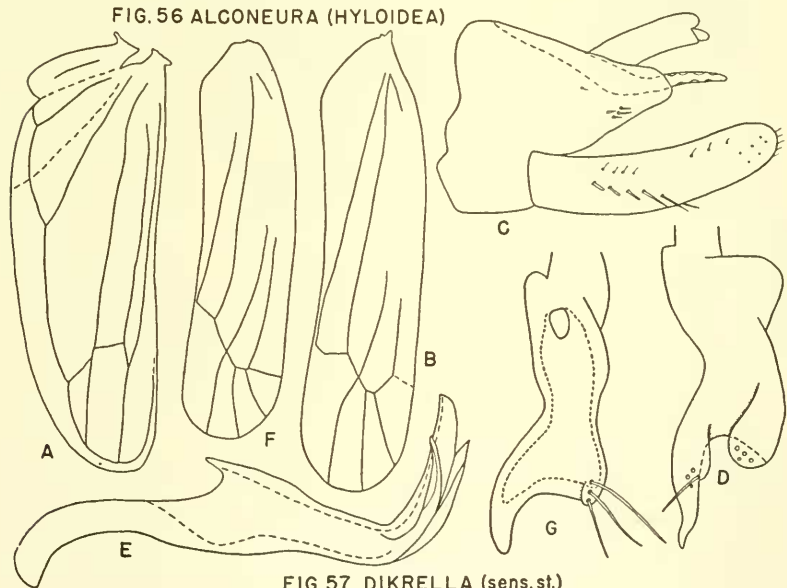


FIG. 57 *DIKRELLA* (sens. st.)

PLATE 22

FIG. 58. *Dikrella (Readionia) readionis*

- C. Male genital capsule, lateral aspect, anal tube not shown ($\times 100$).
- D. Right style, broad aspect (dorsal) ($\times 286$).
- E. Aedeagus, lateral aspect ($\times 286$).
- F. External male genitalia, unmacerated specimen.

FIG. 59. *Idona minuenda*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect ($\times 100$).
- D. Right style apex, dorsal aspect ($\times 286$).
- E. Connective and aedeagus, ventral aspect ($\times 286$).

FIG. 60. *Dikrellidia bilineata*

- C. Holotype, pygofer, lateral aspect ($\times 100$).
- E. Holotype, aedeagus, lateral aspect ($\times 286$).

PLATE 22

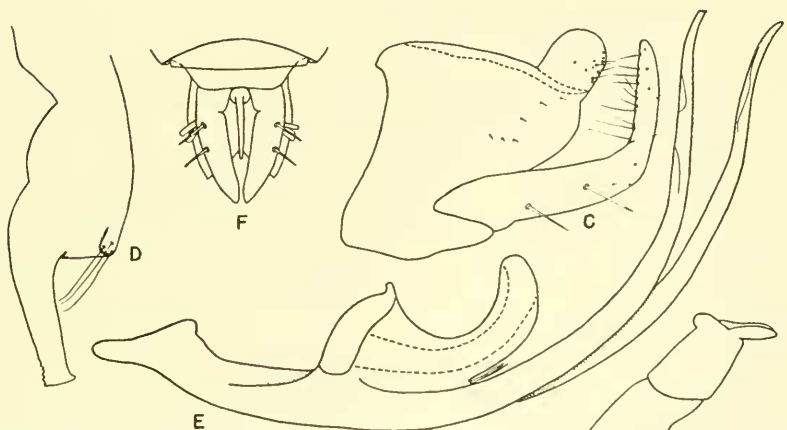


FIG.58 DIKRELLA (READIONIA) READIONIS

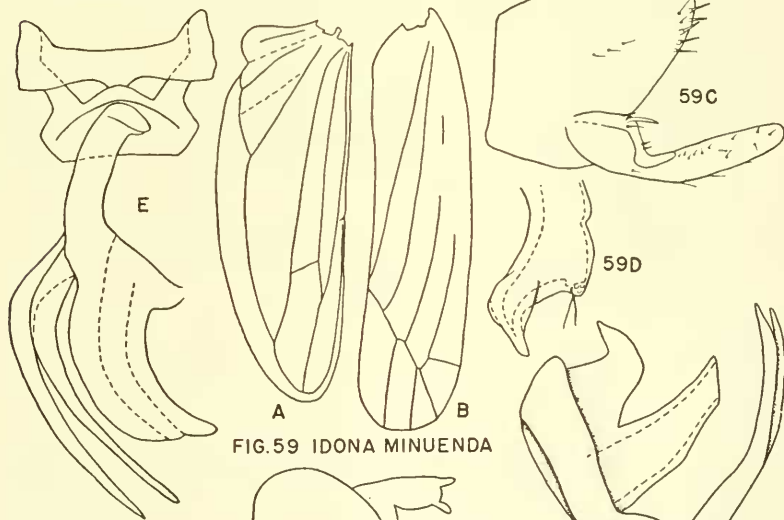


FIG.59 IDONA MINUENDA

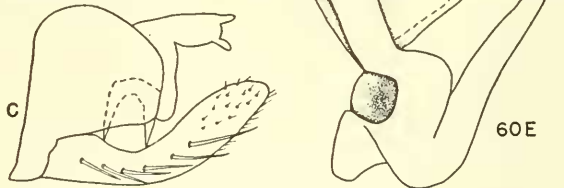


FIG.60 DIKRELLIDIA BILINEATA

PLATE 23

FIG. 61. *Dikrellidia bilineata*

A. Holotype, hind wing.

B. Holotype, fore wing.

FIG. 62. *Kunzella marginella*

A. Hind wing.

B. Fore wing.

C. Male genital capsule, lateral aspect ($\times 100$).

D. Right style, broad aspect (ventral) ($\times 286$).

E. Aedeagus, lateral aspect ($\times 286$).

FIG. 63. *Neodikrella disconotata*

A. Hind wing.

B. Fore wing.

E. Aedeagus, lateral aspect ($\times 286$).

PLATE 23

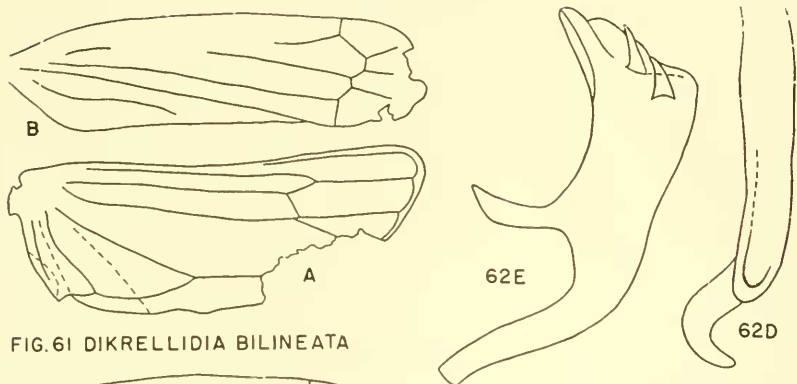


FIG.61 DIKRELLIDIA BILINEATA

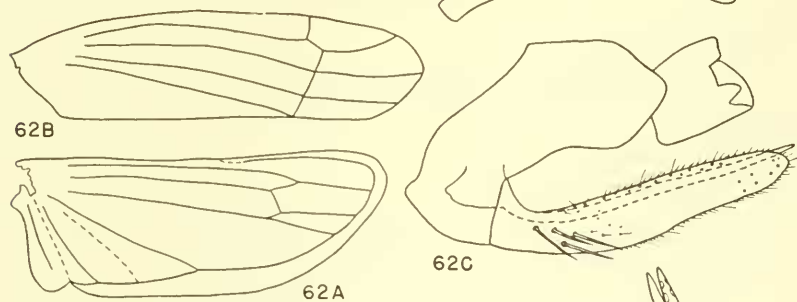


FIG.62 KUNZELLA MARGINELLA

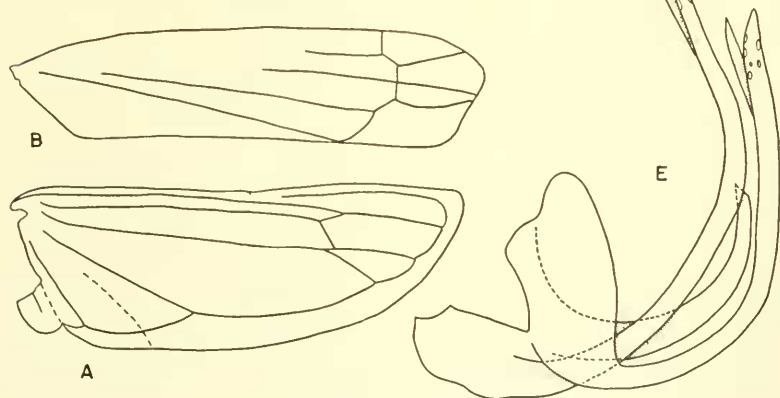


FIG.63 NEODIKRELLA DISCONGTATA

PLATE 24

FIG. 64. *Neodikrella disconotata*

C. Male genital capsule, lateral aspect ($\times 100$).

D. Right style and connective, dorsal aspect ($\times 286$).

FIG. 65. *Sarascarta*

A. *Sarascarta* sp., hind wing.

B. *Sarascarta* sp., fore wing.

C. *Sarascarta fulva*, male genital capsule, lateral aspect ($\times 100$).

D. *Sarascarta fulva*, right style and connective, dorsal aspect ($\times 286$).

E. *Sarascarta fulva*, aedeagus, lateral aspect ($\times 286$).

PLATE 24

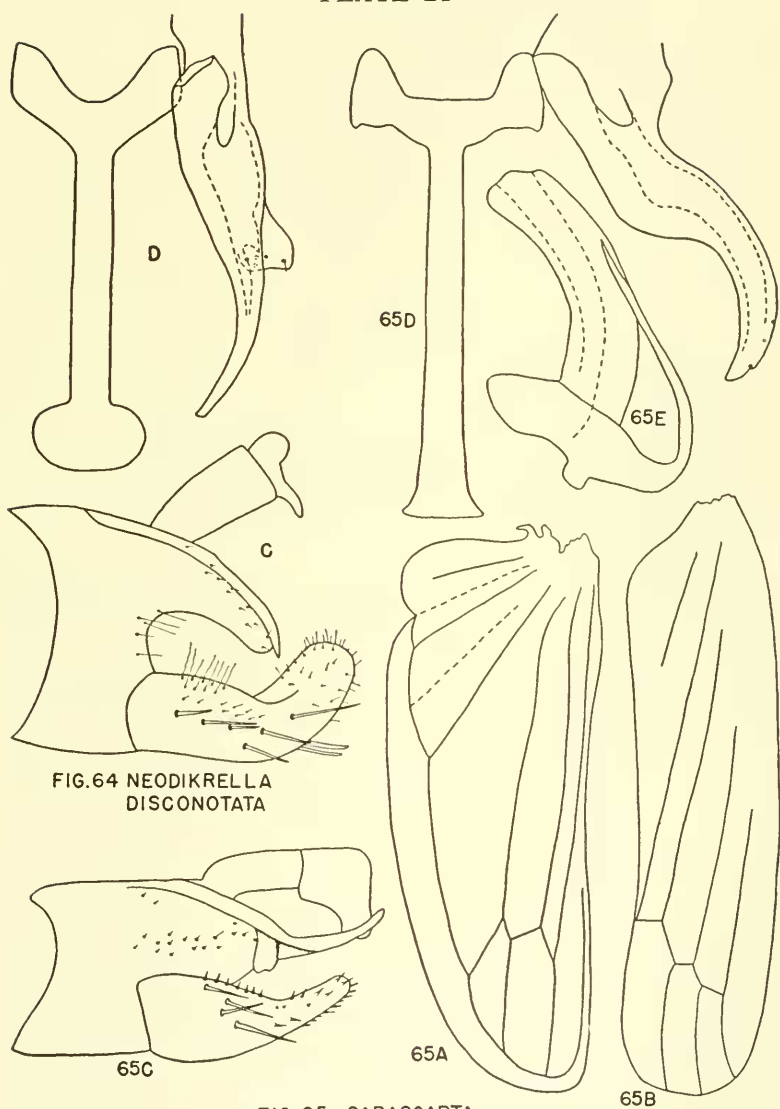


PLATE 25

FIG. 66. *Buritia lepida*

- A. Holotype, hind wing.
- B. Holotype, fore wing.
- C. Holotype, male genital capsule, lateral aspect ($\times 100$).
- D. Holotype, right style, lateral aspect ($\times 134$).
- E. Holotype, aedeagus, lateral aspect ($\times 286$).

FIG. 67. *Saranella micronotata*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect, anal tube not shown ($\times 100$).
- D. Right style and connective, dorsal aspect ($\times 286$).
- E. Aedeagus, lateral and slightly ventral aspect ($\times 286$).
- G. Genital capsule, ventral aspect ($\times 100$), small setae omitted.

PLATE 25

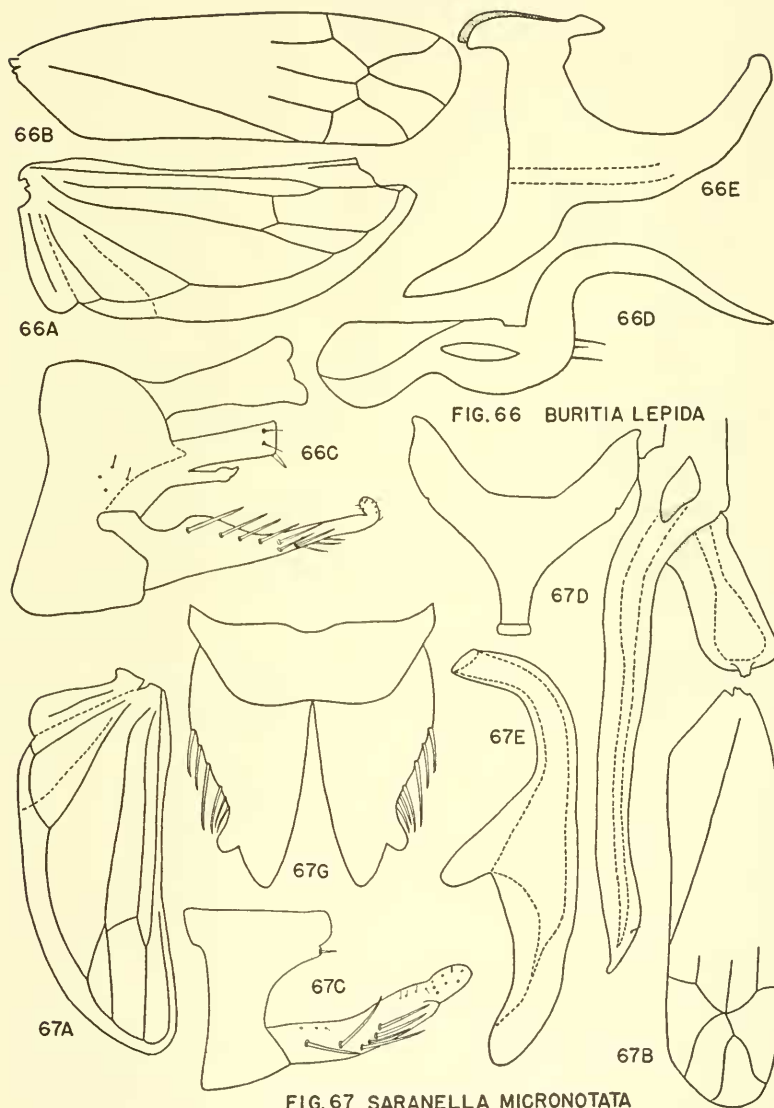


PLATE 26

FIG. 68. *Saranella micronotata*, genital capsule, dorsal aspect ($\times 100$).

FIG. 69. *Hybla maculata*

A. Paratype, hind wing.

B. Paratype, fore wing.

C. Paratype, male genital capsule, lateral aspect ($\times 100$).

D. Paratype, right style ($\times 286$).

E. Paratype, aedeagus, lateral aspect ($\times 286$).

FIG. 70. *Zygina nivea*

A. Hind wing.

B. Fore wing.

C. Male genital capsule, lateral aspect ($\times 100$).

D. Aedeagus, lateral and somewhat dorsal aspect ($\times 286$).

PLATE 26

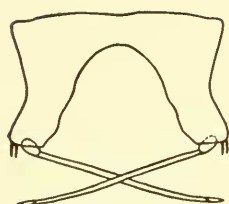
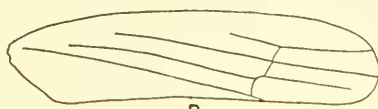
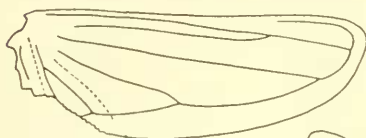


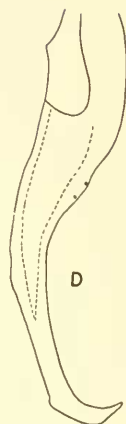
FIG. 68 SARANELLA
MICRONOTATA



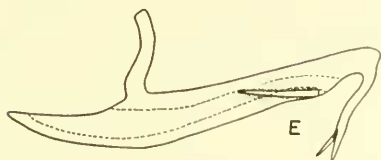
B



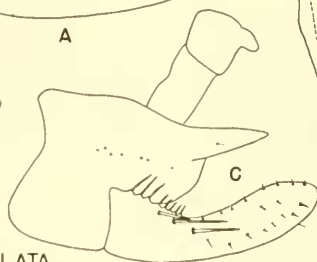
A



D



E



C

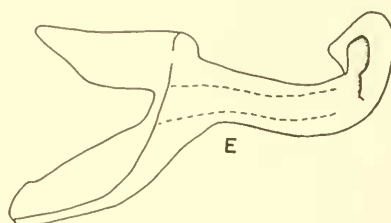
FIG. 69 HYBLA MACULATA



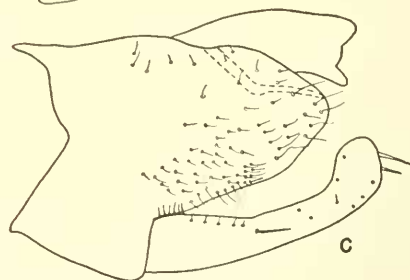
A



B



E



C

FIG. 70 ZYGINA NIVEA

PLATE 27

FIG. 71. *Zygina*

- D. *Zygina nivea*, right style, mesal aspect ($\times 286$).
- F. *Zygina nivea*, connective, dorsal aspect ($\times 286$).
- G. *Zygina kiperi*, right style apex, broad aspect ($\times 286$).

FIG. 72. *Hymetta trifasciata*

- A. Hind wing.
- B. Fore wing.
- C. Male genital capsule, lateral aspect ($\times 100$).
- D. Right style, apical half, broad aspect ($\times 286$).
- E. Aedeagus, lateral aspect ($\times 286$).
- F. Connective, ventral aspect, showing line of attachment of aedeagus ($\times 286$).

FIG. 73. *Erythroneura tricincta*

- C. Male genital capsule, lateral aspect ($\times 100$).
- F. Pygofer, posterodorsal portion, internal aspect ($\times 286$).

PLATE 27

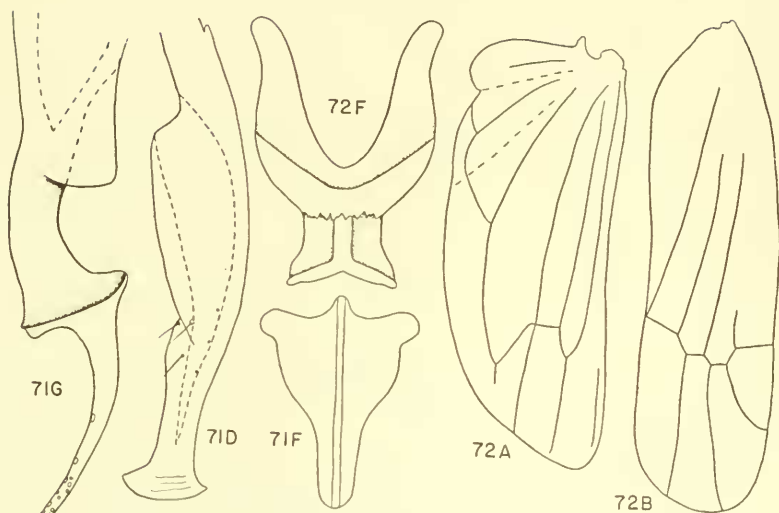


FIG. 71 ZYGINA

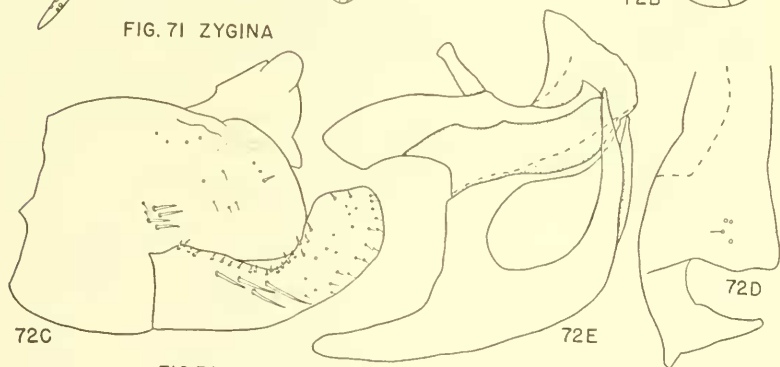


FIG. 72 HYMETTA TRIFASCIATA

FIG. 73 ERYTHRONEURA TRICINCTA

PLATE 28

FIG. 74. *Erythroneura* (*Erythroneura*)

A. *Erythroneura tricineta*, hind wing.

B. *Erythroneura tricineta*, fore wing.

D. *Erythroneura tricineta*, right style, apical half, broad aspect ($\times 286$).

E. *Erythroneura tricineta*, aedeagus, lateral aspect ($\times 286$).

G. *Erythroneura kanwakae*, pygofer process, broad aspect ($\times 286$).

FIG. 75. *Erythroneura* (*Erasmoneura*) *vulnerata*

B. Fore wing.

C. Male genital capsule, lateral aspect ($\times 100$).

D. Right style apex, dorsal aspect ($\times 286$).

E. Aedeagus, dorsal aspect ($\times 286$).

FIG. 76. *Erythroneura* (*Erythridula*) *obliqua*, fore wing.

PLATE 28

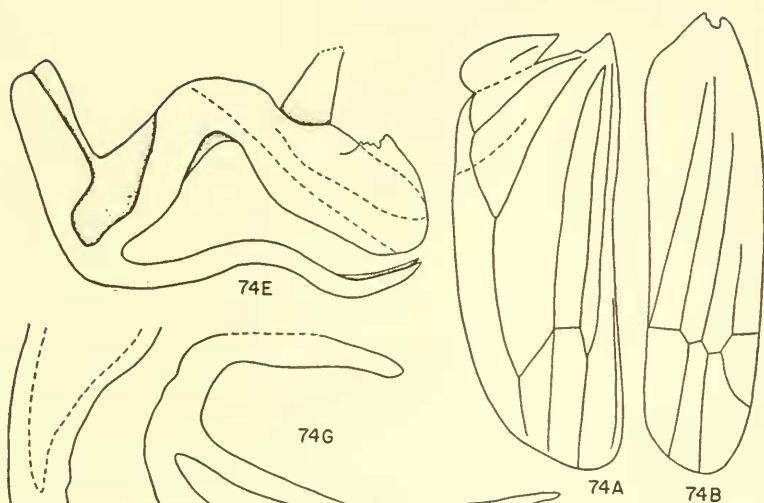


FIG. 74 ERYTHRONEURA (sens.st.)

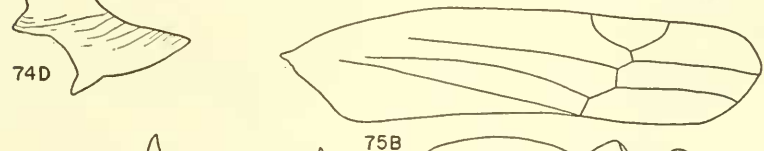


FIG. 75 ERYTHRONEURA (ERASMONEURA)

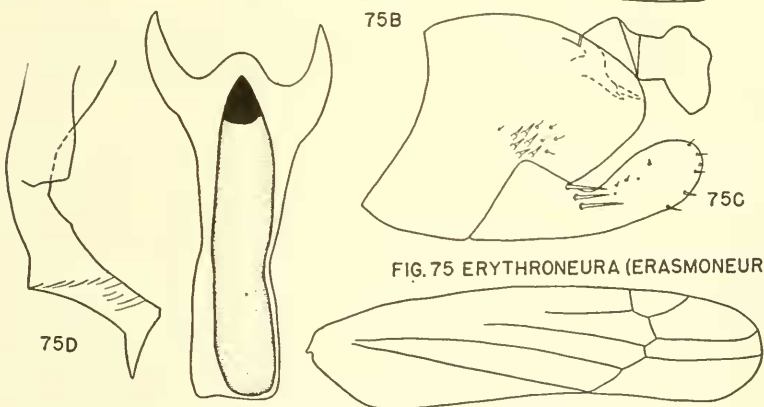


FIG. 76 ERYTHRONEURA (ERYTHRIDULA)

PLATE 29

FIG. 77. *Erythroneura (Erythrídula) obliqua*

C. Male genital capsule, lateral aspect ($\times 100$).

D. Right style apex, broad aspect ($\times 286$).

E. Connective, ventral aspect, and aedeagus, lateral aspect ($\times 213$).

F. Pygofer, right half, dorsal aspect ($\times 134$).

FIG. 78. *Erythroneura (Eratoneura)*

B. *Erythroneura dira*, fore wing.

C. *Erythroneura dira*, holotype, male genital capsule, from balsam mount ($\times 100$), anal tube not shown.

D. *Erythroneura dira*, holotype, right style apex, ventral aspect ($\times 286$).

E. *Erythroneura dira*, holotype, aedeagus, lateral aspect, shaft twisted ($\times 286$).

F. *Erythroneura nevadensis*, aedeagus, ventrolateral aspect ($\times 286$).

G. *Erythroneura rotunda*, aedeagal shaft, lateral aspect ($\times 286$).

PLATE 29

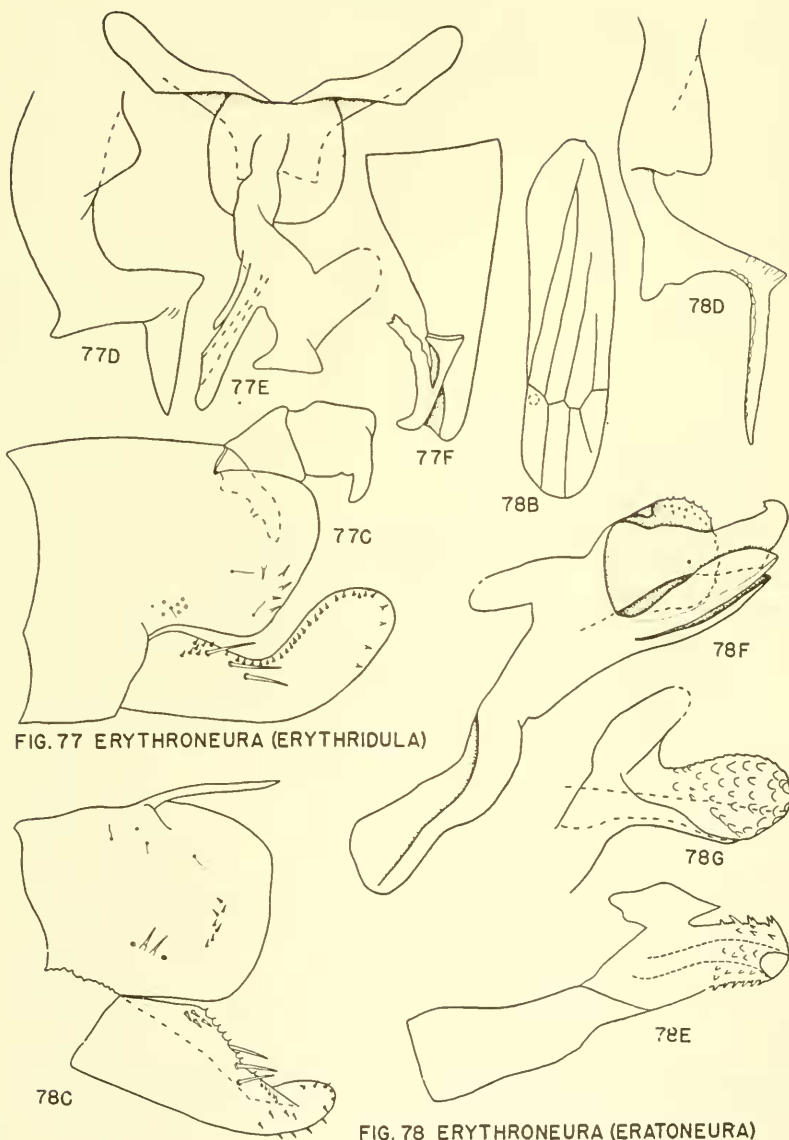


FIG. 77 ERYTHRONEURA (ERYTHRIDULA)

FIG. 78 ERYTHRONEURA (ERATONEURA)

PLATE 30

FIG. 79. *Eupterella mexicana*

- A. Hind wing.
- B. Fore wing.
- C. Paratype, male genital capsule, lateral aspect ($\times 100$).
- D. Paratype, right style, broad aspect ($\times 286$).
- E. Paratype, aedeagus, left lateral aspect ($\times 143$).

FIG. 80. *Eupteroidea stellulata*

- C. Male genital capsule, lateral aspect, anal tube not shown ($\times 100$).
- D. Right style, broad aspect ($\times 134$).
- E. Aedeagus, lateral aspect ($\times 134$).

PLATE 30

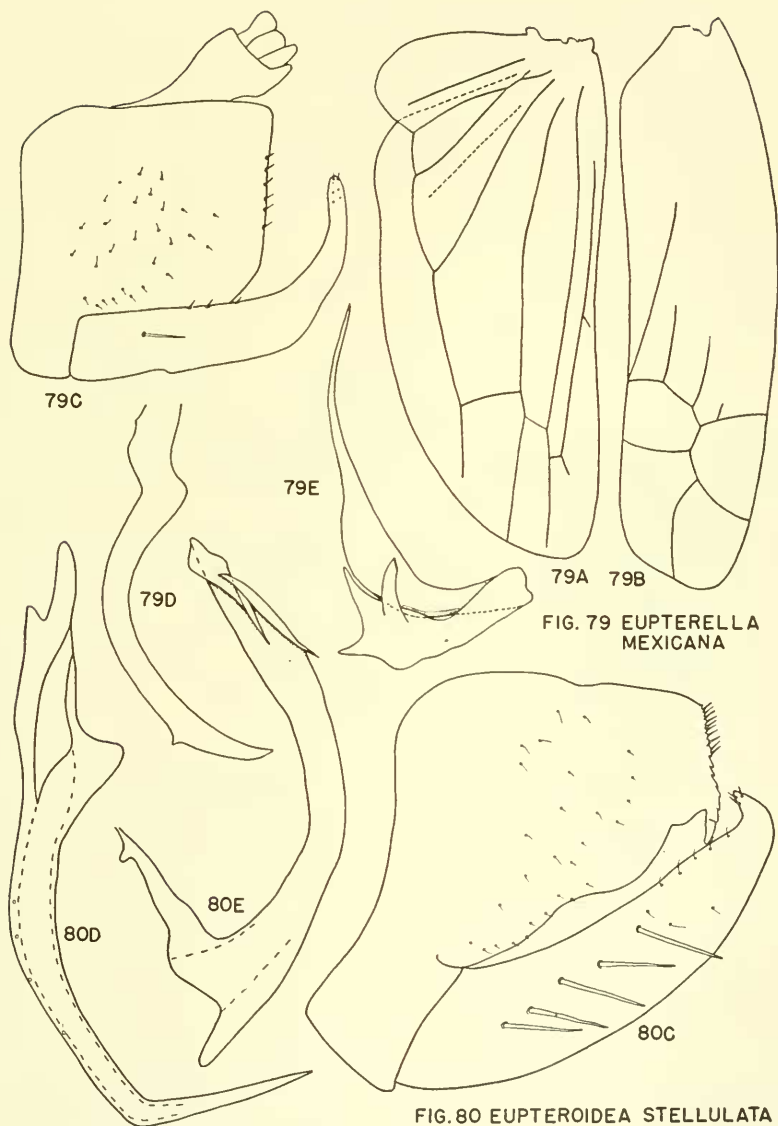


PLATE 31

FIG. 81. *Eupteroidea stellulata*, fore wing, apical half.

FIG. 82. *Eurhadina pulchella*

B. Fore wing, apical half.

C. Male genital capsule, lateral aspect ($\times 100$).

D. Right style, lateral aspect, apical three fourths ($\times 143$).

E. Aedeagus, lateral aspect ($\times 143$).

F. Connective, dorsal aspect ($\times 286$).

FIG. 83. *Eupteryx vittata*

B. Fore wing.

C. Male genital capsule, lateral aspect ($\times 100$).

PLATE 31

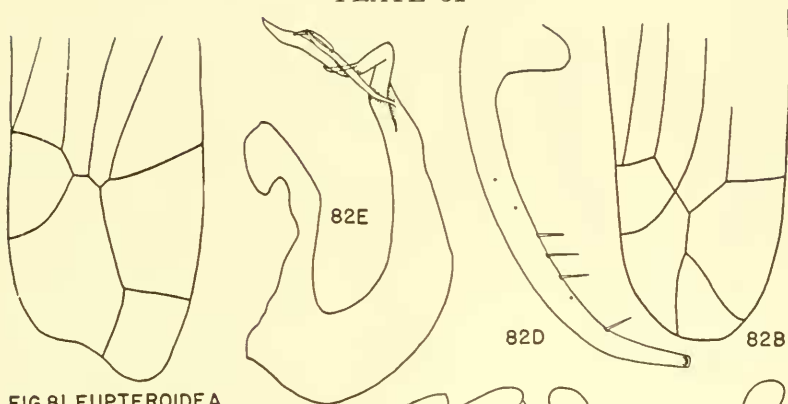


FIG.81 EUPTEROIDEA
STELLULATA

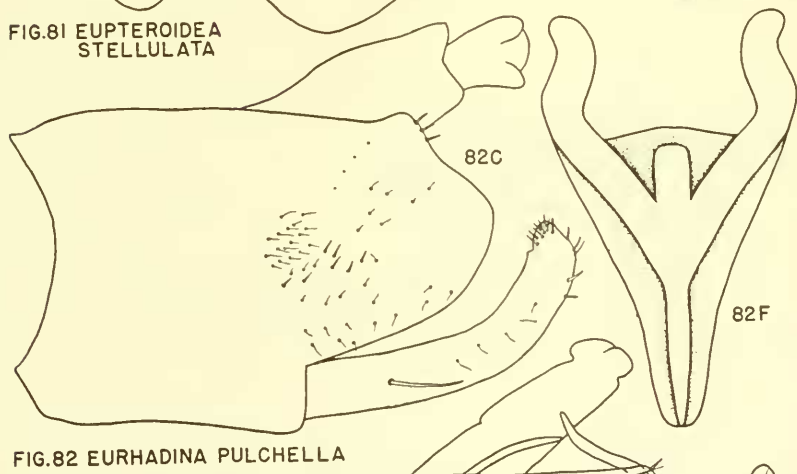


FIG.82 EURHADINA PULCHELLA

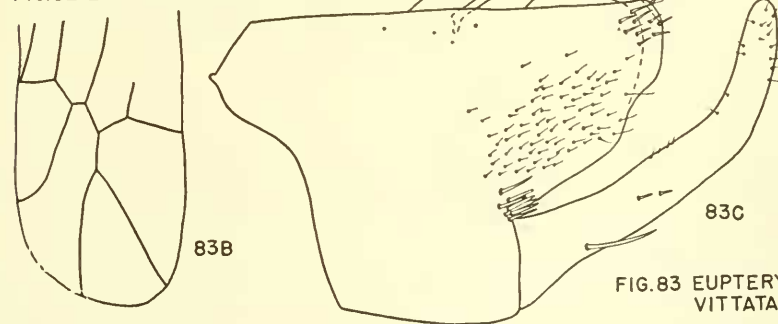


FIG.83 EUPTERYX
VITTATA

PLATE 32

FIG. 84. *Eupteryx vittata*

- D. Right style, broad aspect ($\times 286$).
- E. Aedeagus, lateral aspect ($\times 286$).
- F. Connective, ventral aspect ($\times 286$).

FIG. 85. *Henribautia nigricephala*

- B. Fore wing.
- C. Paratype, male genital capsule, lateral aspect ($\times 100$).
- D. Paratype, right style, entire, dorsal aspect ($\times 286$).
- E. Paratype, aedeagus, lateral aspect ($\times 286$).

PLATE 32

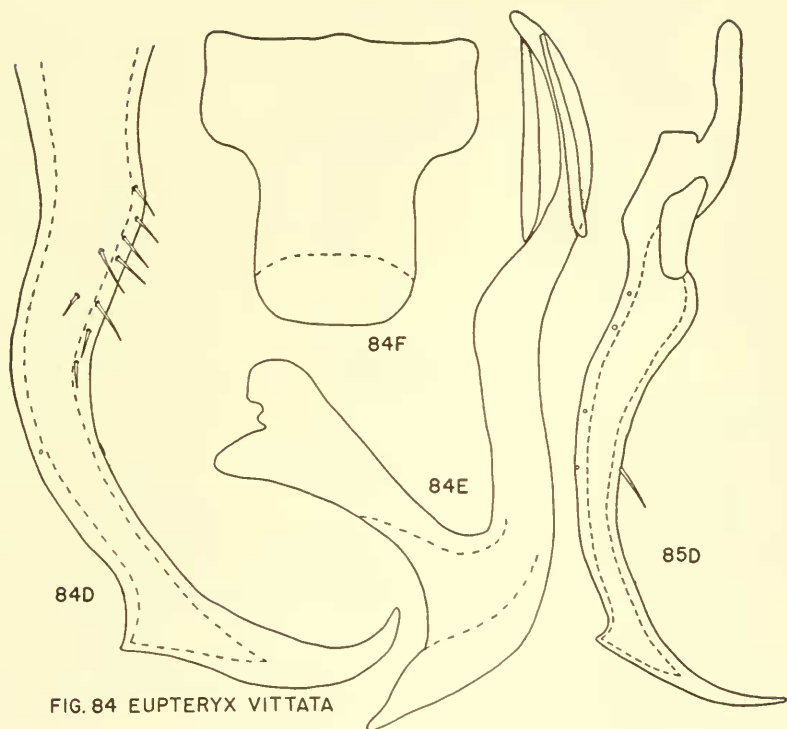


FIG. 84 EUPTERYX VITTATA

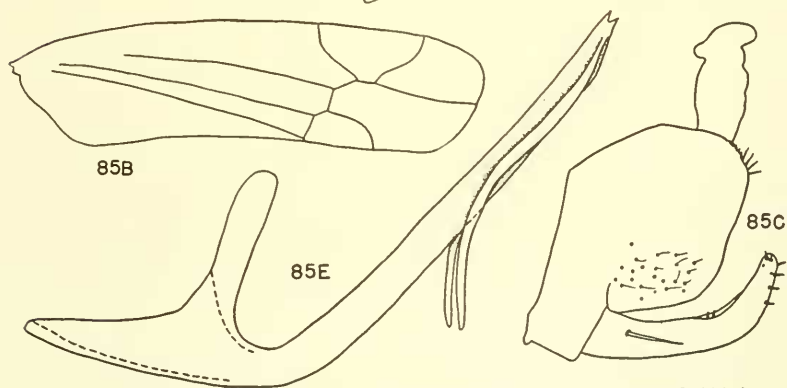


FIG. 85 HENRIBAUTIA NIGRICEPHALA

PLATE 33

FIG. 86. *Ossiannilssonina berenice*

C. Male genital capsule, lateral aspect ($\times 50$).

D. Right style, broad aspect ($\times 134$).

E. Aedeagus, dorsal aspect ($\times 134$).

FIG. 87. *Ribautiana ulmi*

C. Male genital capsule, lateral aspect ($\times 50$).

D. Right style, apical ten thirteenths, broad aspect ($\times 236$).

E. Aedeagus, lateral aspect ($\times 213$).

FIG. 88. *Typhlocyba quercus*

A. Hind wing.

B. Fore wing.

PLATE 33

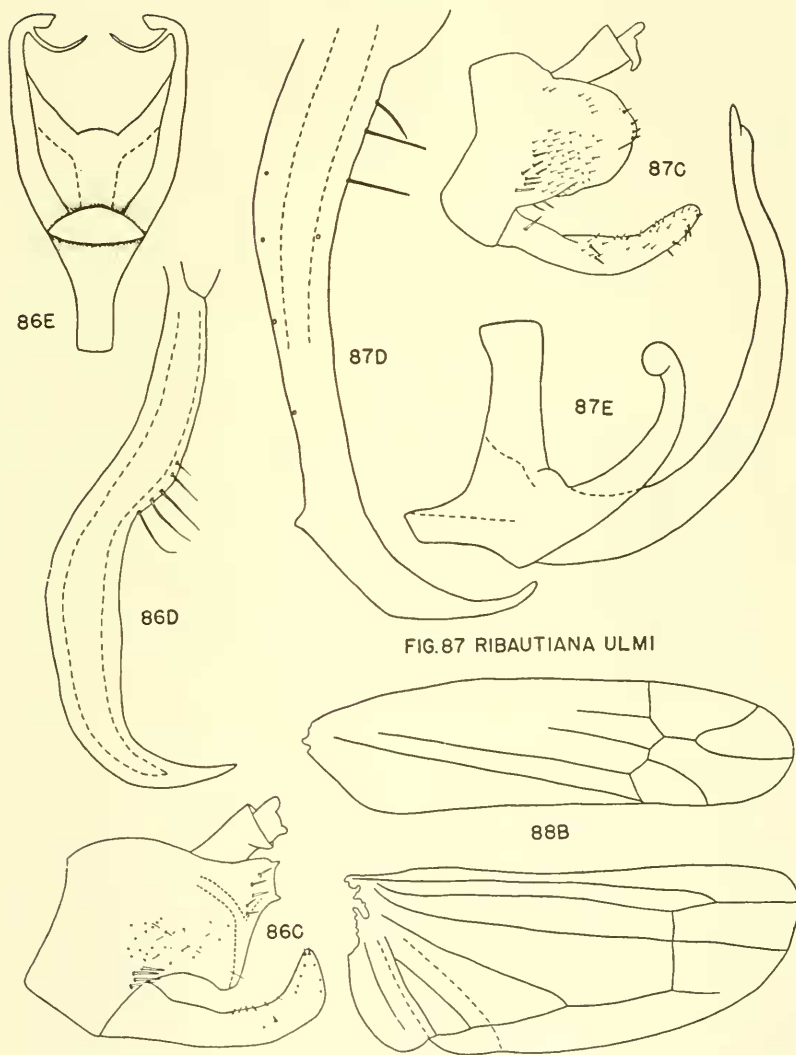


FIG.86 OSSIANNILSSONIA
BERENICE

88A
FIG.88 TYPHLOCYBA QUERCUS

PLATE 34

FIG. 89. *Typhlocyba quercus*

C. Male genital capsule, lateral aspect ($\times 100$).

D. Right style, broad aspect ($\times 286$).

E. Aedeagus, dorsal aspect ($\times 134$).

FIG. 90. *Eualebra smithii*

A. Holotype, hind wing.

B. Holotype, fore wing.

C. Holotype, male genital capsule, lateral aspect ($\times 100$).

D. Holotype, right style ($\times 286$).

E. Holotype, aedeagus, lateral aspect ($\times 286$).

PLATE 34

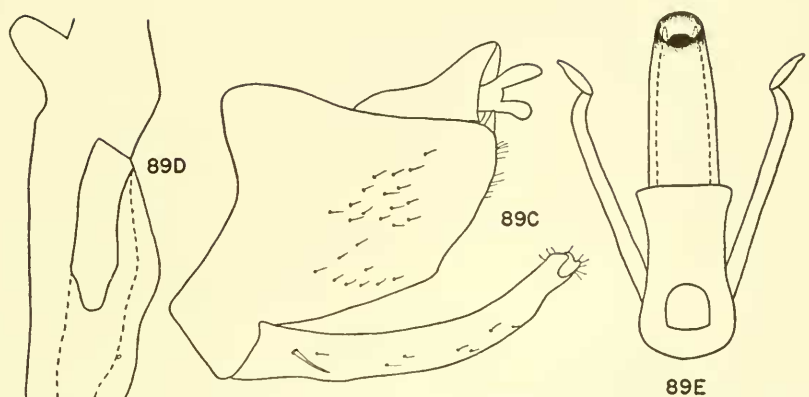


FIG. 89 TYPHLOCYBA QUERCUS

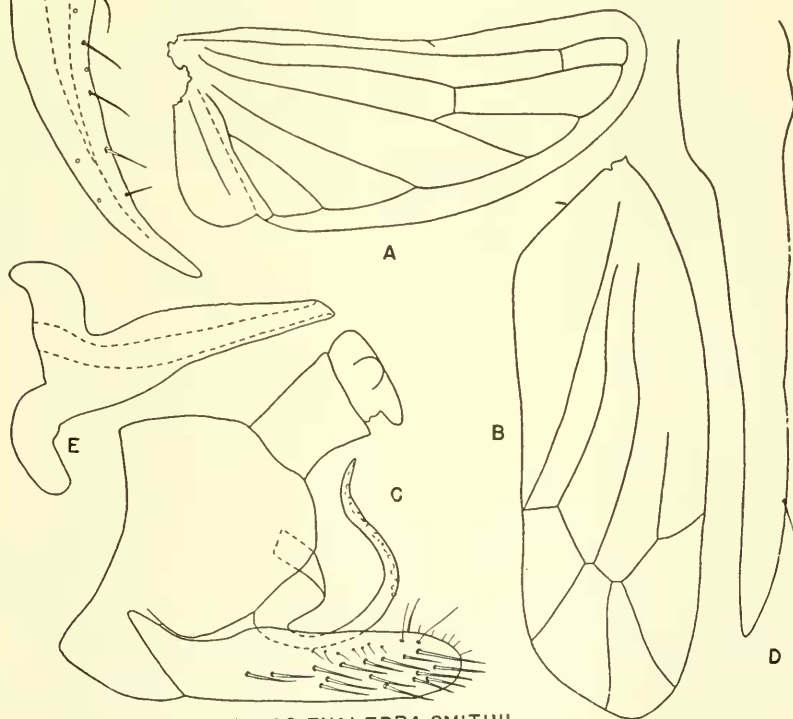


FIG. 90 EUALEBRA SMITHII

PLATE 35

FIG. 91. *Joruma (Joruma) pisca*

- A. Holotype, hind wing.
- B. Holotype, fore wing.
- C. Allotype, male genital capsule, lateral aspect ($\times 100$).
- D. Allotype, right style and connective, dorsal aspect ($\times 286$).
- E. Allotype, aedeagus, lateral aspect ($\times 286$).
- F. Allotype, right style apex, lateral aspect ($\times 286$).

FIG. 92. *Joruma (Jorumidia) curvata*

- C. Male genital capsule, lateral aspect ($\times 134$).
- D. Right style, dorsal aspect ($\times 286$).
- E. Aedeagus, lateral aspect ($\times 286$).

PLATE 35

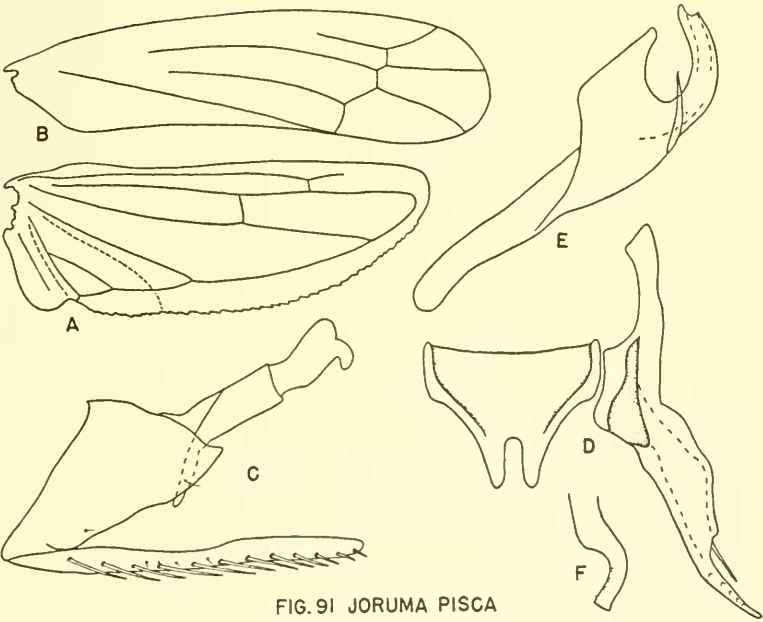


FIG.91 JORUMA PISCA

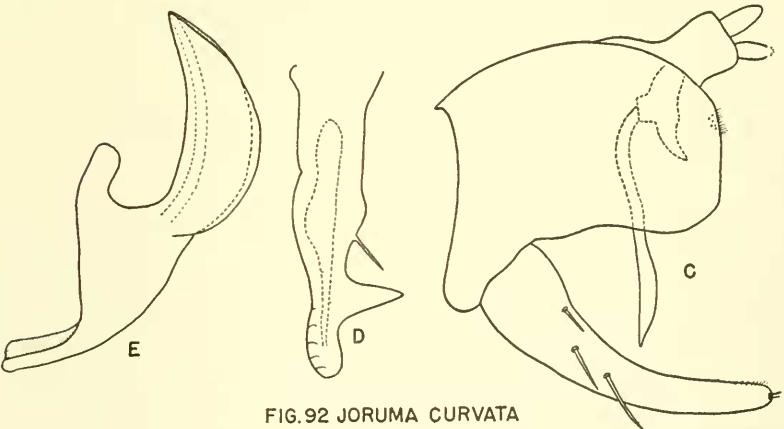


FIG.92 JORUMA CURVATA

PLATE 36

FIG. 93. *Neojoruma adusta*

- C. Holotype, male genital capsule, lateral aspect ($\times 67$).
- D. Holotype, right style, broad aspect ($\times 286$).
- E. Holotype, aedeagus, lateral and slightly dorsal aspect ($\times 100$).

FIG. 94. *Paulomanus cecropiae*

- A. Holotype, hind wing.
- B. Holotype, fore wing.
- E. Holotype, connective, dorsal aspect, and aedeagus, lateral aspect ($\times 67$).
- F. Paratype, right pygofer process, lateral aspect, apical third ($\times 286$).

PLATE 36

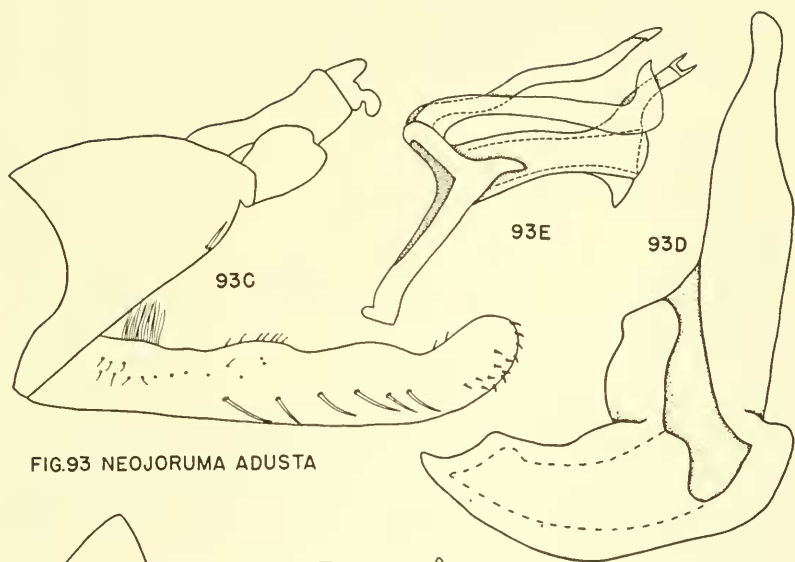


FIG.93 NEOJORUMA ADUSTA

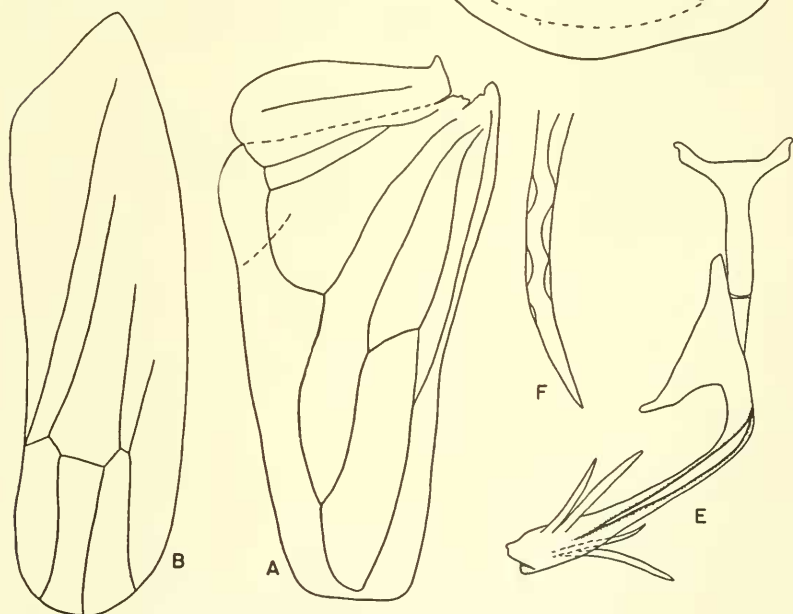


FIG.94 PAULOMANUS CECROPIAE

PLATE 37

FIG. 95. *Paulomanus cecropiae*

- C. Paratype, male genital capsule, lateral aspect (process not shown) ($\times 100$).
- D. Holotype, right style, apical two thirds, from Balsam mount, broad aspect ($\times 286$).

FIG. 96. *Beamerana tropicalis*

- A. Hind wing (from type of *Erythroneura similis*, a synonym)
- B. Fore wing, from same specimen as above.
- C. Allotype, male genital capsule, lateral aspect ($\times 67$).
- D. Allotype, right style, broad aspect ($\times 286$).
- E. Allotype, aedeagus, lateral aspect ($\times 100$).

PLATE 37

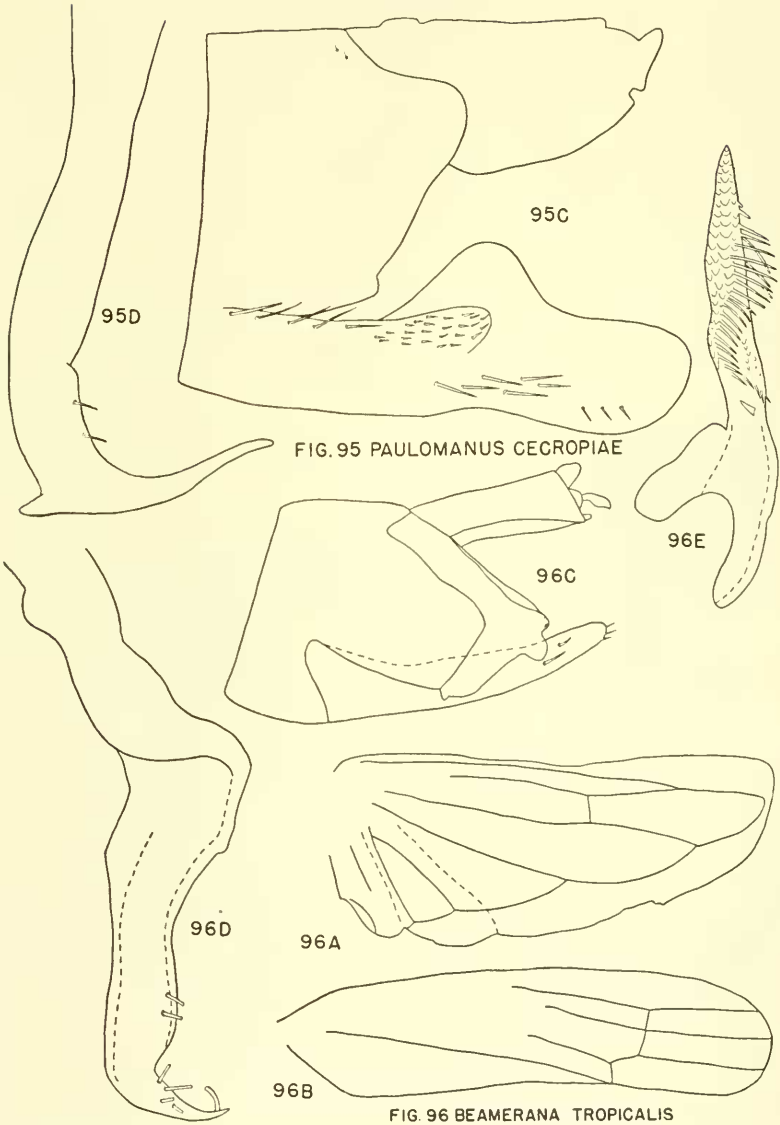


PLATE 38

FIG. 97. *Empoasca*

- A. *Empoasca fabae*, hind wing.
- B. *Empoasca fabae*, fore wing.
- C. *Empoasca fabae*, male genital capsule, lateral aspect ($\times 100$).
- D. *Empoasca fabae*, right style, broad aspect (ventrolateral) ($\times 286$).
- E. *Empoasca fabae*, aedeagus, anterior aspect ($\times 286$).
- F. *Empoasca fabae*, right pygofer process, broad (ventral) aspect ($\times 286$).
- G. *Empoasca confusa*, fore wing.
- H. *Empoasca smaragdula*, right style apex, broad aspect ($\times 286$).

PLATE 38

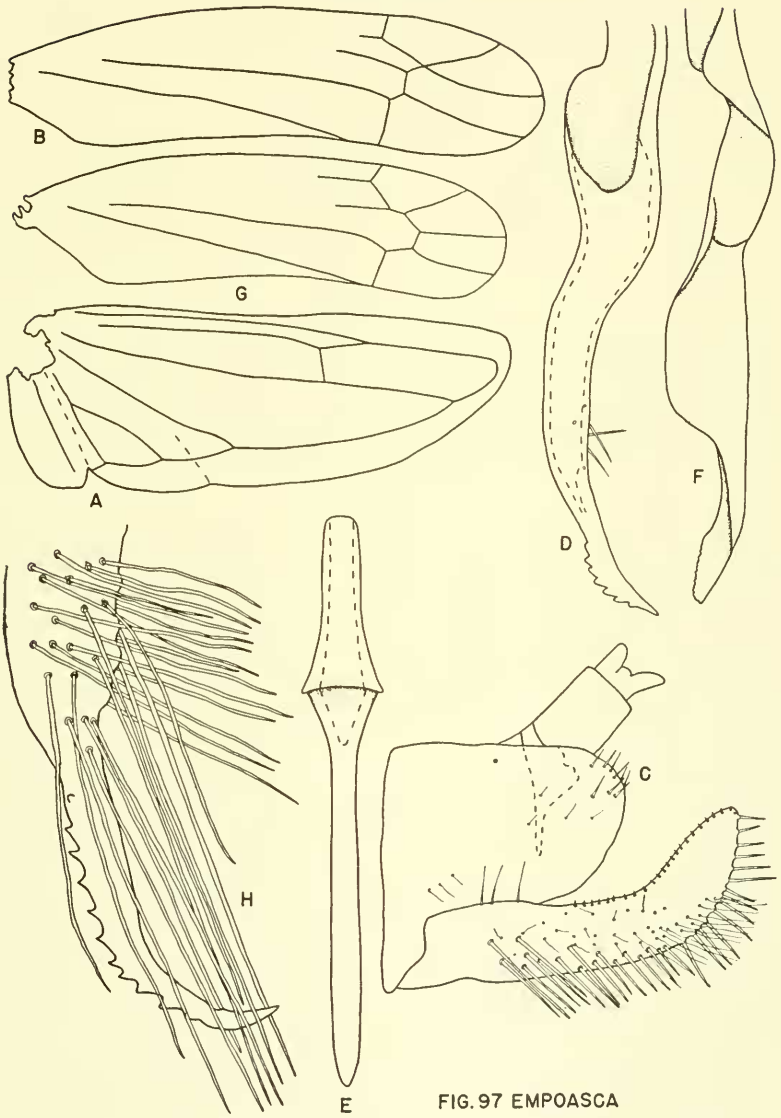


FIG. 97 EMPOASCA